QR Codes on Packaging: A Technology Acceptance Model approach comparing informative and entertaining content.

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ABSTRACT

Title: QR Codes on packaging Acceptance Model: a comparison between informative and entertaining content.

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Nowadays the increase of smartphone usage by consumers has led marketers to design new forms of mobile marketing in order to better connect with them. Among latest marketing trends smart packaging is emerging as one of the most sought after by brands; in particular, the incorporation of QR Code on packaging, is the most widespread form. There are many studies aimed at understanding consumers' behavior towards QR Code, but previous researches lack in determining which are the specific drivers related to QR Code applied to packaging. The present dissertation wants discuss what a QR Code is and which are its applications, together with exploring the challenges and opportunities faced by QR Codes on packaging. The original Technology Acceptance Model (Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, 1989) and its later adaptation (Davis, Bagozzi, & Washaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', 1992) were used in order to build the conceptual framework which includes Perceived Ease of Use, Perceived Usefulness and Perceived Enjoyment as the independent variables and Intention to Use as the dependent variable. Results reveal that all the independent variables have a positive influence on consumers' Intention to Use QR Codes on packaging, where Perceived Enjoyment has the strongest impact. Finally, the non-parametric equivalent of the T-test, the Mann-Whitney U Test, revealed a statistically significant difference in the usage intention of those respondents that saw the entertaining QR Code and those that saw the informative QR Code, suggesting that a QR Code on packaging which directs consumers to an entertaining content leads to increased level of usage intention.
Given the results obtained, this study also discusses possible managerial implications taking into consideration the limitations that affect the entire study.

Keywords: QR Code, Smart Packaging, E-content, Technology Acceptance Model

SUMÁRIO

Title: Incorporação de QR Codes em embalagens Acceptance Model: comparação entre conteúdo informativo e divertido

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Hoje em dia, o aumento da utilização de smartphones pelos consumidores levou os comerciantes a conceber novas formas de marketing móvel, a fim de melhor se conectarem com eles. Uma das últimas tendências é a incorporação de um QR Code na embalagem do produto, o que é considerado como uma forma de embalagem inteligente. Há muitos estudos que têm em vista perceber o comportamento dos consumidores em relação ao QR Code, mas faltam ainda pesquisas anteriores para determinar quais os principais causadores de um tipo específico de QR Code: o aplicado à embalagem. A presente dissertação pretende discutir o que é um QR Code e quais são suas aplicações, juntamente com a exploração dos desafios e oportunidades enfrentados pelos QR Codes em embalagens. O modelo original de Aceitação de Tecnologia (*Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, 1989)* e sua posterior adaptação *(Davis, Bagozzi, & Washaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', 1992)* foram usados para construir a estrutura conceitual que inclui *Perceived Ease of Use* (facilidade de uso), *Perceived Usefulness* (utilidade) e *Perceived Enjoyment* (nível de divertimento) como as variáveis independentes e *Intention of Use* (intenção de uso) como a variável dependente. Os resultados revelam que todas as variáveis independentes têm uma influência positiva na intenção de usar Códigos QR na embalagem, onde a variável com maior impacto é o nível de divertimento. Finalmente, o equivalente não paramétrico do teste T, o teste Mann-Whitney U Test, revelou uma diferença estatisticamente significativa na intenção de uso dos entrevistados que viram o divertido QR Code e daqueles que viram o informativo QR Code, sugerindo que um QR Code na embalagem que direciona os consumidores para um conteúdo divertido leva ao aumento do nível de intenção de uso.
Tendo em conta os resultados obtidos e todas as suas limitações, este estudo também aborda possíveis implicações para os gestores.

Keywords: QR Code, Smart Packaging, E-content, Technology Acceptance Model

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CHAPTER 1: INTRODUCTION

1.1 Background

The number of people using smartphones registered an increase of 1.9% CAGR from 2013, reaching 7.33 billion users in 2019 (The.Radicati.Group, (n.d.)). As a consequence, global expenditure for mobile Internet advertising by marketers has been growing at a 28.1% CAGR from 2015, and it is expected to reach 247.36 billion dollars by 2020 (eMarketer, (n.d.)). Consumers feel increasingly more attached to their smartphones and tend to always carry them, including when they go shopping. For this reason, marketers are coming up with new ideas and methods in order to better reach consumers (Hui, 2016). More specifically, QR Codes are emerging as a form of mobile advertising thanks to their ability to easily and rapidly connect consumers with brands and products directly on their smart devices. Among various types of QR Codes, QR Code applied to packaging, has particularly stood-out lately as a form of smart packaging, a market which is expected to reach 20 billion U.S. dollars by 2021 (BusinessWire, 2017). However, it is not taken for granted that QR Code, as a form of smart packaging, will successfully grow in Italy. In fact, incorporating a QR Code on a product packaging brings many advantages to companies only if used in the right way, such as to enhance brand awareness and positioning, but at the same time there are many challenges that this marketing tool faces. One of the biggest one is that companies incorporate QR Code on products packaging without putting enough effort in understanding which content should be shared with consumers, often underestimating the impact that this cheap but powerful tool can have on the brand and on its relationship with consumers (Pozin, 2012).

1.2 Problem Statement

By exploring and measuring the impact of Perceived Ease of Use, Perceived Usefulness and Perceived Enjoyment on the Intention to Use QR Codes on packaging, the study will try to assess, given its limitations, which are the major determinants of its usage and whether a specific type of content leads to an increase in consumers' willingness to use QR Codes on packaging. In fact, two types of QR Code contents will be compared in terms of their impact on consumers' intention to use it.

In order to address the problem stated above, this thesis will answer the following research questions:

RQ1: "What is QR Code and what are its applications? What are the opportunities and challenges of QR Code on packaging?"

RQ2: "What is the level of awareness of QR Codes on Packaging?"

RQ3: "What are the drivers on a person's likelihood to use QR Codes on packaging?"

RQ4: "What types of content are consumers willing to be directed to once they scan the QR Code?"

1.3 Relevance

This thesis' relevance is supported by three main factors.

First of all, there are many researches on QR Code that study its acceptance and usage level, but they focus on different QR Codes applications and the available literature lacks specific studies on users' acceptance of QR Codes on packaging. For example, many of these researches study consumers' acceptance of QR Codes in general without specifying any context (Ozkaya, Ozkaya, Roxas, Bryant, & Whitson, 2015), other researches study the QR Code as a payment method (Liébana-Cabanillas, Luna, & Ríos, 2015), as a marketing tool but from a different perspective, not considering packaging (Ryu & Murdock, 2013) (Thayer, 2012), as an advertising tool, focusing on its usage on billboards or magazines (Jung, Somerstein, & Kwon, 2012). Secondly, these studies were mainly conducted in Asia, U.S. and few other countries in Europe, but never in Italy, where nevertheless QR Codes on products packaging is widely used. Moreover, in order to make this study more relevant, the research will focus on two main types of QR Code content: informational vs. entertaining. In fact, one of the problems of the QR Code efficacy is whether companies are delivering the right content or not (Pozin, 2012) (Klie, 2012). By doing so, companies may understand which type of content consumers are more willing to be directed to, and thus maximize the benefits granted by QR Codes.

1.4 Research Methods

Research questions 1 to 4 will be answered by collecting both primary and secondary data. Secondary data will be collected by going through the available literature on the QR Code, on its applications, on its specific applications on packaging, on the original Technology Acceptance Model and on its later adaptation by Davis, Bagozzi & Warshaw (1992).
Since the research entails a comparison between two types of QR Code's content (informative vs. entertaining), the study will collect primary data through a questionnaire where one group of people will see an informative QR Code and one group of people will see the entertaining QR Code. For this purpose the following elements were designed in order to make the study more relevant: a new product packaging, two different QR Codes (one informative and one entertaining) and two different websites (one linked to the informative QR Code and the other linked to the entertaining QR Code).

1.5 Dissertation Outline

The thesis consists of five main chapters. This first chapter represents an introduction aiming at giving the reader an overview on the topic and research questions. The Literature Review is then outlined in Chapter 2, which provides the reader with basic knowledge on what a QR Code is, what are its applications today, how it applies on packaging and what are the opportunities and challenges of this marketing tool. Moreover, real examples of QR Codes on packaging will be presented distinguishing between two types of QR Codes: informative and entertaining. Finally the chapter will present the original version of the Technology Acceptance Model, one of its extended versions (Extended TAM: Extrinsic and Intrinsic motivation to use computers in the workplace) and the final conceptual framework of this dissertation (Modified TAM: QR Code on packaging Acceptance Model). Chapter 3 covers the methodology implemented in order to collect data: both primary and secondary data. It will guide the reader through the process of creation of a new packaging, two different QR Codes (one informative and one entertaining) and two main websites linked to the QR Code. Chapter 4 is dedicated to the analysis ran with IBM SPSS in order to answer the remaining Research Questions (RQ2-RQ4) and to the discussion of the results obtained. Finally, Chapter 5 will present the conclusions, limitations and recommendations for further researches.

CHAPTER 2: LITERATURE REVIEW

This chapter aims at enabling the reader to acquire knowledge on QR Codes, its application and its opportunities if used correctly. More specifically, it will introduce the concept of QR Codes on packaging providing real examples of types of content collected by the author. Finally it will review the Technology Acceptance Model and one of its later extensions in order to create a conceptual framework that could explore usage intention of QR Codes on packaging based on the two different types of content previously identified: informative vs. entertaining.

2.1 QR Code and its applications

QR Code stands for Quick Response Code and its invention dates back in 1994, when Denso Wave, a division of Denso Corporation, owned by the Toyota Group, released it in order to track inventory more quickly and more conveniently (Fine & Clark, 2015).

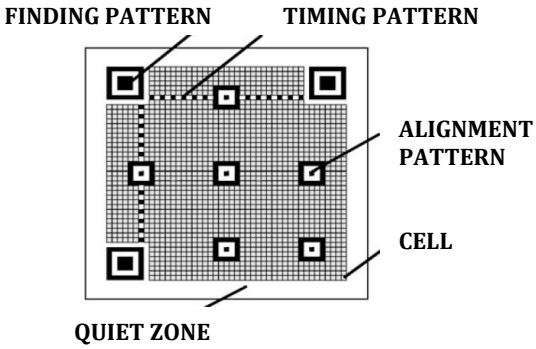

Figure 1: QR Code's elements

The QR Code is a matrix symbol composed by five different elements: the quite zone, which is the white margin around the QR Code that, through contrast, allows it to be more readable; the finding pattern, which consists of the three rectangles at the corners that enable the detection of the QR Code position; the alignment pattern, placed in order to avoid and correct any QR Code distortion; the timing pattern, made of one horizontal and on vertical lines connecting the finding patterns; and finally the cells, which consist in the "data area", the section in which data is stored (Soon, 2008).

Nowadays QR Codes are used in different contexts and for different purposes: not only to track

different products but, for example, to add Facebook users, to connect Whatsapp chats on the laptop, to finalize payments, to collect additional information on a specific product, to allow fast online purchasing, to receive discounts, to advertise movie trailers and so on (Coleman, 2011). A study on QR Codes carried out in 2015 revealed that most of the respondents encountered QR Codes on product packaging, pharmaceutical and drug packaging, coupon, magazine advertisements, newspaper advertisements, catalogs, outdoor advertisement and television. However, the context in which QR Code was most often encountered is products packaging (Demir, Kaynak, & Demir, 2015).

QR Code applied to packaging consists of a form of smart packaging. More precisely, three different types of smart packaging were identified: design-led, active and connected. QR Code on packaging is part of connected packaging, defined as:

"*Packaging that contains technology (e.g. sensors, codes, and tags) capable of generating data that can be captured, treated, analyzed and communicated to people or machines to change behavior in the physical world*"

(Armstrong, Herrmann, Fazio, & Duckworth, 2018)

QR Codes' potential to reach consumers directly on their phones is not the only reason why marketers are engaging in this new trend. In fact, if used in the right way, QR Codes on packaging can provide them with real advantages. One first advantage is that QR Codes can storage a huge amount of content, including media such as videos and images. In this way QR Codes on packaging become a meaningful link between offline and online and can provide consumers with additional contents that can't be directly printed on the packaging because of the limited space available.

As demonstrated by several studies, packaging itself is considered to be a powerful marketing tool and an important product element that can be determinant in product positioning (Ampuero & Vila, 2006) and branding strategy (Butler, 2013). Packaging's efficacy as a marketing tool is strengthened by the inclusion of technology, which in turns increases the packaging's potential to increase customer engagement, satisfaction and retention, by making consumer's engagement with the product more interactive (Armstrong, Herrmann, Fazio, & Duckworth, 2018) (Asare & Asare, 2015). The level of customer engagement and trust is considered to be

higher when the company shares more information about the product by being completely transparent towards consumers (Huang, 2018). Moreover, a new trend regarding QR Codes consists of the customization of the QR Codes itself in terms of color and images, making it a powerful branding tool that can increase brand awareness (Asare & Asare, 2015). An example includes the Guinness QR Cup Campaign in 2012, in which the company has created special cups that, once filled with beer (exclusively Guinness beer) would show a QR Code connecting the customers directly to the company's Facebook Page and accessing discounts (Mall, 2015). Finally, the implementation of a QR Code is cheap, and this makes all of the aforementioned advantages even more valuable because it automatically translates itself in a convenient marketing tool (Ashford, 2010) (Asare & Asare, 2015) (Gramigna, 2017)**.**

However, even though an increase in QR Code usage for marketing purposes has been registered (Fine & Clark, 2015), this new trend is still in its "adolescent" maturity level (Huang, 2018). In fact, there are two main issues considered as the main causes behind QR Codes limited usage so far, and that will be explored in the present dissertation. The first problem is QR Code awareness (Klie, 2012). In fact, not everyone is aware that it is possible to find and scan these QR Codes on packaging, and if consumers do not know about its existence they don't look for it. The second problem is that companies might deliver the wrong content to consumers, and, as a consequence, they are not willing to scan the QR Code (Pozin, 2012)**.** What are consumers willing to see once they scan a QR Code? In order to make the QR Code an efficient marketing tool and to exploit all its advantages, it is important that companies think of which type of content is likely to drive consumer's use of QR Codes on packaging. By collecting a number of products that included a QR Code on the packaging it was possible to distinguish between two different types of content:

1. **Informational Content**. This type of QR Code directs the consumer to the company's website in the informative section, where it is possible to know more about the company's itself, its corporate social responsibility and sustainability, additional information about specific products and their ingredients.
2. **Entertaining Content**. The QR Code directs the consumer to content such as videos, contests, discounts, cooking recipes, games and so on.

	Coca-Cola, in Italy, has printed QR Code on cans. Once the QR Code is scanned the	

Coca Cola https://www.coca-cola.it/it/future-legend/	consumer receives a promotional code that allows the consumer to listen to unreleased songs by famous singers and vote for the best. This initiative is called "Future Legend", the first music contest through cans.	**Entertaining**
Kemon https://www.kemon.com	Kemon's main business is hair product. In Italy it has added on the packaging of a hair conditioner a QR Code. Once scanned, the QR Code directs the consumer on the company's webpage in the section of CSR. They are sharing through the QR Code their effort to respect the environment and to avoid any damage to it. They also share their certifications such as "Love Nature", "Certified Vegan" and "I am green plastic".	**Informative**
De Cecco https://www.dececco.com/pt_en/	De Cecco is an Italian brand for pasta. The company has included on the primary packaging a QR Code that, once scanned, directs the consumer on the company's webpage. This webpage provides consumers with additional information on the company and includes the following sections: "Our History", "Certification", "Our Method" and finally "Products".	**Informative**
Condi https://condi.pt	Condi is a Portuguese brand, which can be considered a leader in the powder desserts industry. The QR Code is located on the primary packaging of powder sugar. Once scanned, the QR code directs the consumer to a page where he/she can access entertaining videos showing the preparation of desserts. These videos are proper tutorial videos.	**Entertaining**

***Table 1*:** Real examples of different contents

***Figure 2*:** Entertaining QR Code on Coca-Cola's packaging

***Figure 3*:** Informative QR Code on Kemon's hair cream packaging

***Figure 4*:** Informative QR Code on De Cecco's pasta packaging

***Figure 5*:** Informative QR Code on Condi's powder sugar packaging

2.2 Technology Acceptance Model

Together with the Theory of Interpersonal Behavior and the Theory of Planned Behavior, the Technology Acceptance Model (TAM) finds its roots in the Theory of Reasoned Action, developed in 1975 by Fishbein and Azjen, and which explores consumers' behaviors through attitudes, social norms and intentions (Taherdoost, 2018).
TAM was developed in order to construct and validate "*new scales for two specific variables, perceived usefulness and perceived ease of use, which are hypothesized to be fundamental determinants of user acceptance*" (Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, 1989).

Even though the Technology acceptance model was originally developed in order to understand individual's acceptance and adoption of technology at workplace, it was proved that is able to predict consumers acceptance of new form of mobile marketing that have been developed in recent years. In fact, extended versions of the Technology Acceptance Model have been used to research consumers' acceptance of marketing communications through QR Codes (Ryu & Murdock, 2013) (Thayer, 2012).

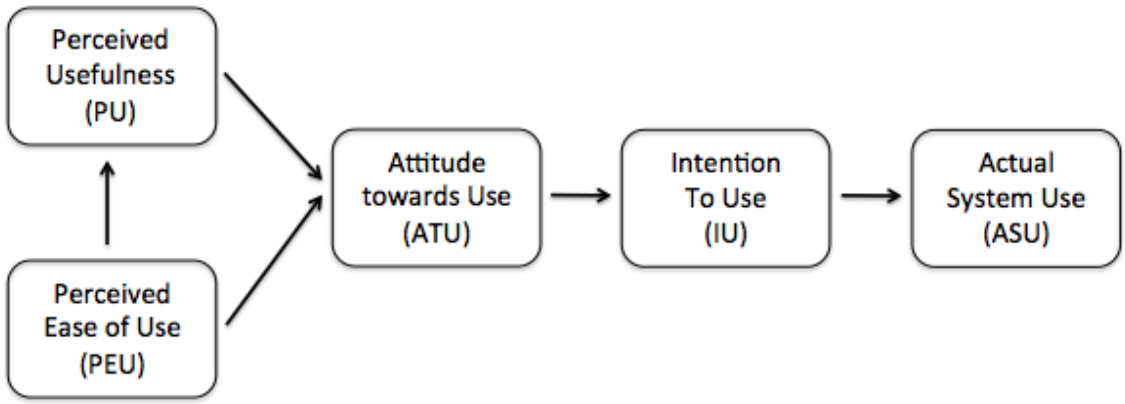

Figure 6: TAM, Davis 1989

According to the TAM, individuals tend be willing to adopt a new technology when it is perceived to be useful and easy to use. In fact, as demonstrated, these two are the main determinants of consumers' acceptance of a technology. Moreover, the findings show that perceived usefulness also plays the role of mediator between perceived ease of use and usage intention (Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, 1989).

Perceived Usefulness (PU)

Studies with regard to individuals' motivation have always identified two distinct categories: extrinsic motivation and intrinsic motivation. We should refer to extrinsic motivation when *"a situation contains a specific goal which provides satisfaction independent of the actual activity itself"* (Calder & Staw, 1975). Following Calder & Saw's (1975) definition of extrinsic motivation, Davis, Bagozzi and Warshaw refer to it as *"the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pays or promotions*" (Davis, Bagozzi, & Washaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', 1992). Through Perceived Usefulness, the TAM wants to explore individuals' extrinsic motivation of using a computer system.

PU: "*the degree to which a person believes that using a particular system would enhance his or her job performance*" (Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, 1989)

Perceived Usefulness has been proved to be the strongest determinant of individuals' intention to use a technology (Davis, Bagozzi, & Washaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', 1992). Fishbein and Azjen (1975) defined intention as *"a person subject probability that he will perform some behavior"*. This suggests that the extent to which the individual finds the QR Code useful will influence his/her intention to its usage. For this reason:

H1a: Perceived Usefulness has a positive impact on consumers' intention to use of QR Codes on Packaging.

Perceived Ease of Use (PEU)

Although usefulness-usage relation was stronger, Davis' study on the two determinants of usage shows that an ease-usage relation exists too.

PEOU: *"the degree to which a person believes that using a particular system would be free of effort*" (Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, 1989)

Not only Perceived Ease of Use has a strong impact on consumers' acceptance of a new technology, but it also has a positive impact on Perceived Usefulness, which mediates the ease-usage relationship. This means that a high level of perceived ease of use will directly impact and positively influence consumers' intention to use QR Codes applied on packaging, but it will also impact on perceived usefulness, which behaves as a mediator in their relationship.

H2a: Perceived Ease of Use has a positive impact on consumers' intention to use QR Codes on packaging
H2b: Perceived Ease of Use has a positive impact on Perceived Usefulness of QR Codes on packaging

2.3_Extended TAM: Extrinsic and Intrinsic motivation to use computers in the workplace

Few years later, in 1992, the TAM has been modified, and one important variable, which did not capture the attention of many researchers before, was introduced: Enjoyment. Davis, Bagozzi & Warshaw (1992) have extended the original version of the TAM in order to study how individuals' perceived enjoyment, other than perceived usefulness, would impact on their intention to use and their effective usage of computers when working.

Indeed, the proposed model considers as the main determinants of Usage Intention and Actual Usage of computer system at the workplace, Perceived Usefulness and Perceived Enjoyment, which explained, together, 62% (in the first study) and 75% (in the second study) of the variance in usage intention (Davis, Bagozzi, & Washaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', 1992). Not only the latter are directly influencing usage intentions, but they also play the role of mediators in the following relationships: Perceived Ease of Use-Usage Intention and Output Quality-Usage Intention. Output Quality, which is the second "new entry" of the proposed model, is defined as the "*intermediate or end products of using the system, such as documents, graphs, calculations, and the like*" (Davis, Bagozzi, & Washaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', 1992).

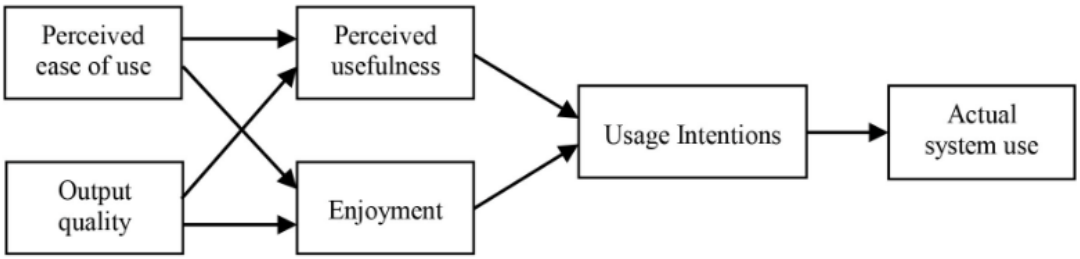

***Figure 7**:* Extrinsic and Intrinsic motivation to use computers in the workplace (Davis, Bagozzi & Warshaw 1992)

Perceived Enjoyment

By including Perceived Enjoyment, the authors wanted to study how workers' intrinsic motivation would influence the usage intention and the actual usage of computers. We refer to intrinsic motivation as "*the doing of an activity for its inherent satisfactions rather than for some separable consequence*" (Ryan & Deci, 2000). Here, intrinsic motivation is studied in the form of Perceived Enjoyment, which is defined as follows:

> **PE:** "*extent to which the activity of using the computer is perceived to be enjoyable in it's own right, apart from any performance consequences that may be anticipated*" (Davis, Bagozzi, & Washaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace', 1992).

Marketers are increasingly designing and developing products that make it possible for consumers to interact with it. Not only interactivity is of utmost importance nowadays, but it is also one feature of the QR Code. Perceived enjoyment has been considered as a determinant variable of QR Code usage in many researches, it has never been linked to the different types of content that the consumer can be directed to once the QR Code is scanned. For example, Chong (2017) found that Perceived Enjoyment was a strong determinant of consumers' intention to accept QR Code as a general marketing tool. Moreover Thayer (2012) suggests that future researches on QR Code as a marketing tool should explore how intrinsic motivation, and thus, enjoyment, would impact on consumers' intention to use it.

Finally, Perceived Enjoyment also plays the role of mediator in the relationship between Perceived Ease of Use and Usage intention. In fact, as demonstrated by Davis, Bagozzi and Warshaw (1992), a high level of perceived ease to use leads to an increased perception of enjoyment, which in turns has a significant impact on usage intention.

H3a: Perceived Enjoyment has a positive impact on consumers' intention to use QR Codes on Packaging.

H2c: Perceived Ease of Use has a positive impact on Perceived Enjoyment of QR Codes on packaging

2.4 Modified TAM: QR Code on packaging Acceptance Model

The Technology Acceptance Model and its findings, together with its extension by Davies, Bagozzi and Warshaw (1992), constitute the base for the conceptual framework that will make it possible to explore the hypothesis anticipated throughout the literature review.

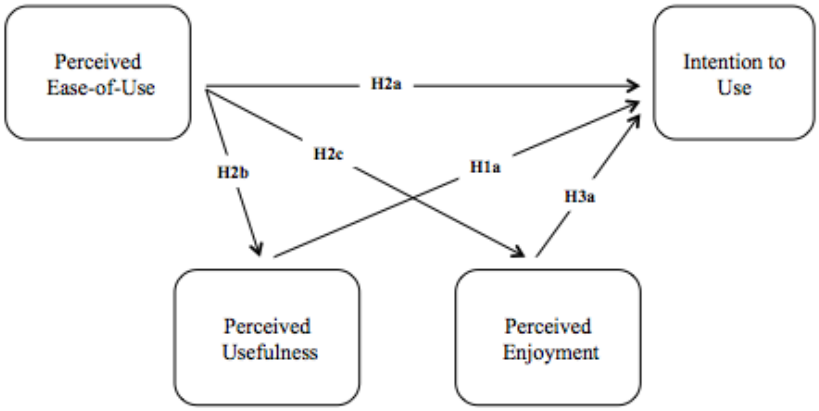

Figure 8: Modified TAM: QR Code on Packaging Acceptance Model

The proposed conceptual framework exploits already existing variables in order to explore consumers' intention to use QR Codes on packaging. On one hand it finds its roots in the study carried out by Davies (1989), taking into account Perceived Usefulness and Perceived Ease of Use and exploring their direct relationship with intention to use and the mediation effect of Perceived Usefulness in the ease-usage relationship. On the other hand, it also considers intrinsic motivation as suggested by Davis, Bagozzi and Warshaw (1992) by introducing Perceived Enjoyment in the model. However, one major difference is that the proposed model does not take into account the variable Output Quality, which can't be applied to this specific model.

The proposed model, which represents a modified version of the Technology Acceptance Model, is a multiple mediator model, where Perceived Ease of Use is the Independent Variable and Intention to Use is the Dependent Variable. Perceived Usefulness and Perceived Enjoyment play the role of mediators.

Perceived Usefulness (PU)	The extent to which consumers perceive that QR Codes on packaging are useful
Perceived Ease of Use (PEOU)	The degree to which consumers perceive QR Codes on packaging are easy to use and require small effort
Perceived Enjoyment (PE)	The degree to which consumers perceive QR Codes on packaging to be enjoyable and entertaining
Intention to Use (IU)	Consumers' intention to scan QR Codes on packaging in the future

Table 2: Definitions applied to the proposed conceptual model

HYPOTHESES	DESCRIPTION
H1a	Perceived Usefulness has a positive impact on consumers' intention to use QR Codes on Packaging.
H2a	Perceived Ease of Use has a positive impact on consumers' intention to use QR Codes on packaging
H2b	Perceived Ease of Use has a positive impact on Perceived Usefulness of QR Codes on packaging
H2c	Perceived Ease of Use has a positive impact on Perceived Enjoyment of QR Codes on packaging
H3a	Perceived Enjoyment has a positive impact on consumers' intention to use of QR Codes on Packaging.

Table 3: Hypotheses

CHAPTER 3: METHODOLOGY

3.1 Secondary Data

In order to answer Research Questions 1-4 both secondary and primary data was collected.

Secondary data was collected and used for the purpose of building Chapter 2: Literature Review. As a matter of fact data presented in Chapter 2 makes it possible to answer **RQ1**:

What is QR Code and what are its applications? What are the opportunities and challenges of QR Code on packaging?

However, even though Chapter 2 enables the reader to acquire basic knowledge on what the QR Code is, how does it apply on packaging and what are the main opportunities and challenges, primary research is necessary in order to study more in depth consumers' behavior with regards to QR Codes on packaging.

Thus, primary data will be collected in order to answer the remaining following research question:

RQ2: What is the level of awareness of QR Codes on Packaging?
RQ3: What are the drivers on a person's likelihood to use QR Codes on packaging?
RQ4: What type of content is consumers willing to be directed to once scanned the QR Code?

3.2 Primary Data

Primary data was collected through a survey that was built in order to explore how variables such as Perceived Ease of Use, Perceived Usefulness and Perceived Enjoyment of QR Code on packaging impact on consumers' intention to use it.
The survey is composed of 33 questions and was distributed first by email and later the questionnaire was shared in Facebook groups, mainly university Facebook groups.
First of all, respondents answered questions on demographics and after that, since the stimulus regarded a bottle of water, a question on whether they drink bottled water or not was asked. When the answer to this question was negative, respondents were considered unable to continue the survey, and thus, were redirected to the end of the survey.

After this first screening, there is a question which was added in order to measure respondents' level of awareness of QR Codes on packaging and thus, to answer **RQ2.**
From this point, consumers will be directed to different branches according to the randomization factor as follow:

- 1/3 of respondents were immediately asked to answer questions in order to measure their Perceived Ease of Use, Perceived Usefulness and Perceived Enjoyment of QR Codes on packaging.
- 1/3 of respondents will be invited to scan with their phones an "Informative" QR Code, directing them to the water company's website in the section in which more information about the product and its sustainability is available. After that, they were asked to give their opinion on Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment and Usage Intention.
- 1/3 of respondents were invited to scan with their phones an "Entertaining" QR Code, directing them to the water company's website in the section in which they can play three different quizzes in order to win one free month on Spotify Premium (the prize was fake and respondents were informed). After that, they were asked to give their opinion on Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment and Usage Intention.

Finally, at the end of the survey, respondents where asked four questions on their habits with regards to QR Codes. Hopefully, these questions will enable the researcher to know more about respondents' usage of this marketing tool and to enrich the research with valuable insights, that could be used in order to build managerial implications.

3.3 Brand New Packaging and QR Code Generation

The purpose of this research is to understand whether a consumer is more intentioned to scan an informative QR Code or an entertaining QR Code on packaging.
For this reason, before the questionnaire was sent, few steps were completed:

1. Since the focus is on packaging, a brand new packaging was created in order to avoid any kind of bias. The type of product chosen is a plastic bottle of water, and this is for two main reason: first of all almost everyone has drunk from a plastic bottle and thus, the kind of packaging is common to everyone; secondly, this specific product can be associated with both informative and entertaining content. To better explain this point I

will take into account the example of Coca Cola. The latter is a product that is mainly associated to entertaining contents, more precisely to music, and for this reason couldn't be taken into consideration for this specific research. This works for every product that can be associated to only one of the types of content and not to both.

As it is possible to observe in ***Figure 9***, the new packaging is a plastic bottle of water that includes the following elements: name of the brand, which is fake in order to avoid bias, date in which the water company was founded, type of water, size of the water bottle, water facts, barcode, recyclable logo, company's website, company's Facebook account and finally a QR Code.

Figure 9: New product packaging

2. Two different QR Codes were created in order to respect the characteristics of the informative and entertaining QR Codes. There are many websites that allow creating and customizing free QR Code. The website used by the researcher was QR Code Monkey (https://www.qrcode-monkey.com/#url).

Figure 10: Informative QR Code

Figure 11: Entertaining QR Code

3. Finally, two different websites to which respondents are directed once they scan the QR Code were created. One website for the informative QR Code (https://frallales.wixsite.com/santadomitilla) that allows consumers to gather additional information about the company, such as the history, a map that shows the exact place in which the water is taken, sustainability projects such as BIO packaging and finally a chat box that allows respondents to ask more questions. The other website is for the entertaining QR Code (https://frallales.wixsite.com/santadomitilla2) that simulates three different games among which the respondents can choose. In fact, it gives respondents the chance to win one free month on Spotify Premium by playing one of the three quizzes presented on the website: one quiz is about the company's history, one quiz is about music and the last one is a science quiz. Respondents are informed at the end of the quiz that the prize is not real and that the websites were exclusively created for the thesis. With regards to the entertaining QR Code, two other websites were created: one for those who win the quiz (https://frallales.wixsite.com/congratulations) and one for those who loose it (https://frallales.wixsite.com/ohnoyoulost).

3.4 Construct Measurement

Chapter 1 was fundamental in order to explore previous researches and in order to find valid construct measurements for Perceived Ease of Use, Perceived Usefulness, Perceived Enjoyment and finally Intention to Use. Perceived Ease of Use was measured according to Davis (1989), who is the author of the Technology Acceptance Model, and who proofed the validity and reliability of his measurement (Cronbach alpha = **0.94**), consisting of 5 items measured on a 7-points scale. In order to measure Perceived Usefulness, the measurement used by Jayasingh & Eze (2010) was adopted. The latter successfully used an extended version of the Technology Acceptance Model in order to investigate consumers' adoption of Mobile Coupons. Their conceptual framework included Perceived Usefulness, which constituted of 5 items measured on a 7-points scale. The measurement built by Jayasingh & Eze (2010), proofed its validity with a Cronbach alpha of **0.963**. Davis, Bagozzi & Warshaw (1992) included Perceived Enjoyment for the first time in the Technology Acceptance Model as a predictor of Usage Intention. Given the validity of this measurement (Cronbach alpha = **0.92**) and its fit into the present dissertation, it was used in order to measure Perceived Enjoyment of QR Codes on packaging. This construct consists of three items measured on a 7-points scale. The last construct is Intention to Use and its measurement was adapted from the one proposed by Hui

(2017), who studied consumers' behavioral intention with regards to QR Codes as a marketing tool, but never mentioned packaging as the specific "host" of QR Code. Moreover, Hui (2017) did not use a Technology Acceptance Model, but he based his research on Diffusion of Innovation Theory. His conceptual framework included Intention to Use that scored a Cronbach alpha of **0.886**.

Construct and Literature	Adapted Items	Measurement
Perceived Ease of Use Davis (1989)	**1.** Learning to operate QR Code on packaging would be easy for me **2.** I would find it easy to get QR Code on packaging to do what I want to do **3.** My interaction with QR Code on packaging would be clear and understandable **4.** I would find QR Code on packaging to be flexible to interact with **5.** It would be easy for me to become skillful at using QR Code on packaging	**7-points scale (Likely/Unlikely)**
Perceived Usefulness Jayasingh & Eze (2010)	**1.** Using QR Code on packaging would make me a smarter consumer **2.** Using QR Code on packaging would make my shopping easier **3.** Using QR Code on packaging would save money **4.** Using QR Code on packaging make shopping more enjoyable **5.** Overall QR Code on packaging is very useful	**7-points scale (Strongly agree/Strongly disagree)**
Perceived Enjoyment Davis, Bagozzi & Warshaw (1992)	**1.** I find using QR Code on packaging to be enjoyable (likely/unlikely) **2.** Using QR Code on packaging) would be (unpleasant/pleasant) **3.** I would have fun using QR Code on packaging (likely/unlikely).	**7-points scale (Likely/Unlikely) (Unpleasant/Pleasant)**
Intention to Use Hui (2017)	**1.** I intend to increase my use of QR code on packaging **2.** I intend to invest my time and effort to QR code on packaging **3.** I intend to use QR codes on packaging in the future.	**7-points scale (Strongly disagree/Strongly agree)**

Table 4: Constructs Measurements

3.5 Data Analysis

The data gathered from the distribution of the online survey was analyzed by using the IBM SPSS Statistic Platform. The very first analysis consists of descriptive statistics and frequencies that finally allow an in-depth analysis of the sample. Cronbach's Alpha is calculated for each construct in order to assess their validity. Normal distribution of data is assumed according the Central Limit Theorem, and when the number of respondents was reduced because of the analysis of two different groups, non-parametric analyses were implemented. Simple Linear Regression Analysis and Weighted Least Squares Regression Analysis are used on SPSS in order to explore the relationships among all the variables (Perceived Usefulness, Perceived Enjoyment, Perceived Ease of Use and Intention to Use). In order to ensure validity of the analysis, all the assumptions are first checked and then results interpreted. In order to investigate the existence of a mediation effect in the relationship ease-usage, where the mediator are either Perceived Usefulness or Perceived Enjoyment, Model 4 from PROCESS macro is used and direct and indirect effects are compared. Finally, the Mann-Whitney U Test is run in order to see whether a statistically significant difference in usage intention is found between the two groups that saw two different QR Codes.

CHAPTER 4: RESULTS AND DISCUSSION

This chapter aims at presenting the results obtained throughout the analysis on IMB SPSS and at their discussion. The first part of the chapter analyzes step by step how the researcher obtained the final, valid sample population and studies in depth its characteristics. After that, the validity of the construct measurements is assessed in order to proceed with the analysis and the four hypotheses presented in the Literature Review, Chapter 2, are tested. The second part of this chapter is dedicated to the discussion of the results obtained going through each Research Question.

4.1 Sample Characterization

Before every kind of analysis was started, the dataset was cleaned from all the errors by checking minimum, maximum and missing values of each variable.
The survey distributed has collected a total of 465 answers. However, not all of them are valid and, before the sample characterization is presented, it is worthwhile to understand every step that led to the final and valid sample, made of 309 answers.

First of all, the questionnaire reported 32 responses in progress that from now on will not be counted in the final sample, which now accounts for 433 answers.
As presented in the Methodology section, Chapter 3, the questionnaire included 3 main screening questions:

1. The first screening question was: ***"Do you drink bottled water?"***
   In fact, the stimulus presented to the respondents consisted of a bottle of water whose label included a QR Code, that is the object of the analysis. For this reason, all those people not drinking bottled water were not invited to continue the questionnaire and from now on they will be excluded from the analysis. Out of the 433 responses, 25 will not be considered because they answered "no" to this question (***Figure 12)***. This result suggests that they probably drink filtered water or simply drink sink water.

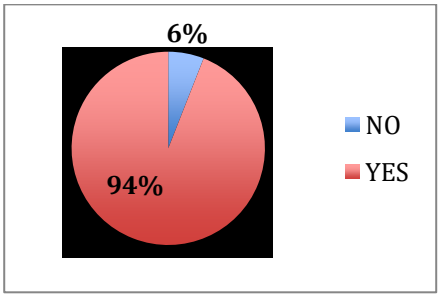

Figure 12: Answers to the question *"Do you drink bottled water?"*

2. The second screening question was: ***"Do you own a smartphone?"***
   Since the questionnaire required the respondents to scan the QR Code with their smartphone, only those who own a smartphone could continue with the questionnaire. However, nowadays it is very common to own this kind of device, and as a matter of fact only 4 people out of 408 claimed that they don't own a smartphone, leading to a sample made of 404 responses.
3. The third, and most important screening question was: ***"Did you scan the QR Code?"***
   As explained in the Methodology section, the questionnaire would generate three different groups of people: one control group, which after the stimulus would directly fill the questionnaire; one group that was invited to scan the informative QR Code and finally complete the questionnaire; one group that was instead invited to scan an entertaining QR Code and then to fill the questionnaire. The last two groups, which were nudged to scan the QR Code, were asked the above-mentioned screening question. In this way, only those people that effectively scanned the QR Code would proceed with the questionnaire. Out of 404 respondents 89 did not scan the QR Code and from now on will not be considered for further analysis and thus, the sample accounts for 315 responses.

   The respondents whose answer to this question was negative were also asked to specify why they did not scan the QR Code. The main reasons were either that they did not know how to scan or that they did not have an App to scan the QR Code (***Figure 13)***. Fortunately, none of the respondents that could not scan the QR Code stated that it was due to a malfunctioning of the QR Code itself.

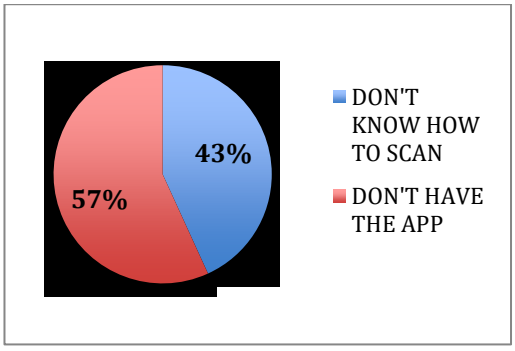

Figure 13: Answers to the question *"Why didn't you scan the QR Code?"*

Finally, cases 2, 4, 26, 106, 112 and 254 were deleted because considered outliers.
The final sample is made of 309 valid responses that are divided as following:

- 103 respondents that are part of the control group
- 103 respondents that scanned the informative QR Code
- 103 respondents that scanned the entertaining QR Code

The sample population was analyzed by conducting descriptive analysis on SPSS.

As we can see from ***Figure 14*** the number of people who answered the questionnaire is almost evenly distributed among males and females, 126 and 183 respectively. ***Figure 15*** shows the age distributions and we can observe that the dominant age range is *18-29 years* old (255 respondents), leaving all the other age ranges with small representativeness of the sample.

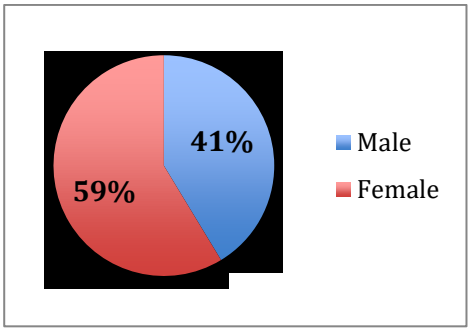

Figure 14: Demographics: Gender

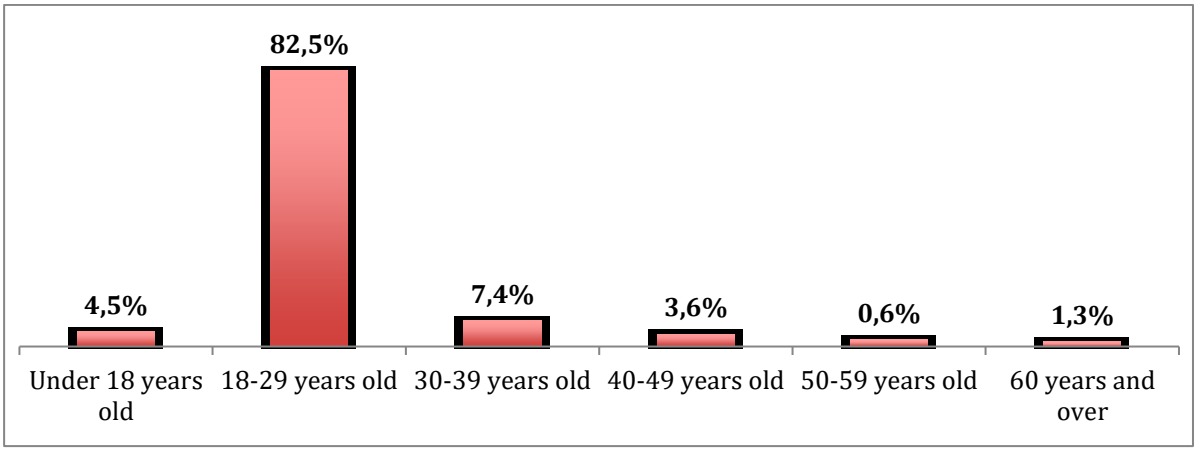

Figure 15: Demographics: Age

The education distribution showed in ***Figure 16*** reveals that the sample population is quite well educated with most of respondents that have accomplished either an Undergraduate or a

Postgraduate Degree, 95 and 190 respectively. As the data regarding age and education suggests, the majority of participants is distributed among students (45,3%) and people employed full time (40,1%). This, together with the age range, suggests that most of the respondents are still completing their degrees or started working for their first job after university. Even though the questionnaire was meant to reach people of different ages, with diverse education levels and employment status, it was inevitable that these results would show. In fact, the distribution of the questionnaire took place in two different ways: at the beginning it was shared by email, in a second moment the link to the questionnaire was published on different university students Facebook groups. This led to a high percentage of young, well-educated students and full-time employees that, given the prevailing age range, are probably experiencing their first job after their graduation.

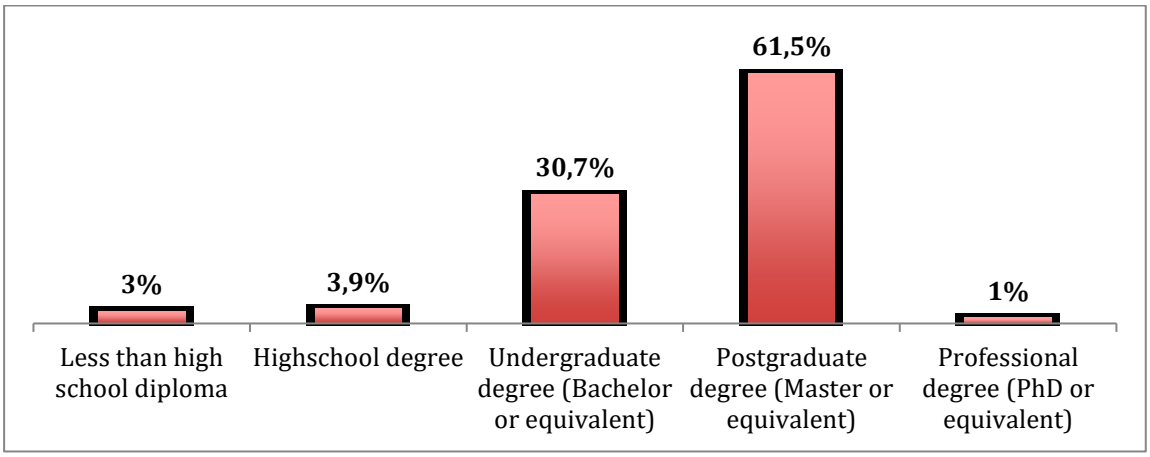

Figure 16: Demographics: Education

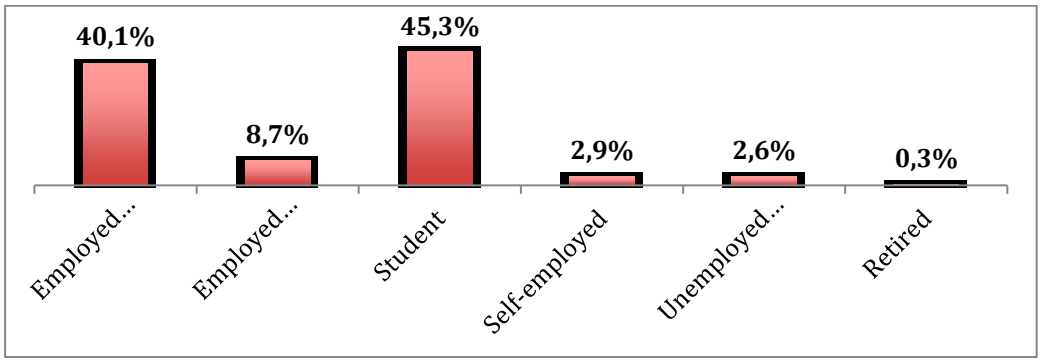

Figure 17: Demographics: Employment

Analyzing the yearly gross income shared by the respondents it is possible to state that it is coherent with all the other results. In fact, 49,5% of the respondents perceives less than 10,000, which is reasonable because 45% of the sample population is made of students; 7,4% perceives

between *10,000 and 19,000*; 12,3% between *20,000* and *29,000;* 11% between *30,000 and 39,000*; almost 10% of the sample population preferred not to answer. The residual is spread among the other yearly gross income levels.

Finally, since the questionnaire was distributed on universities groups that are joined by people from different countries, respondents were also asked to indicate their nationality. Inevitably, the prevailing nationality is *Italian,* with a total of 204 respondents out of 309 (***Figure 18***).

However the analysis of the sample population revealed that *51* out of 309 respondents are Portuguese, *33* are German and 17 come from France. Finally a very small number of respondents accounting for no more that 0,7% for each nationality are American, English and Brazilian.

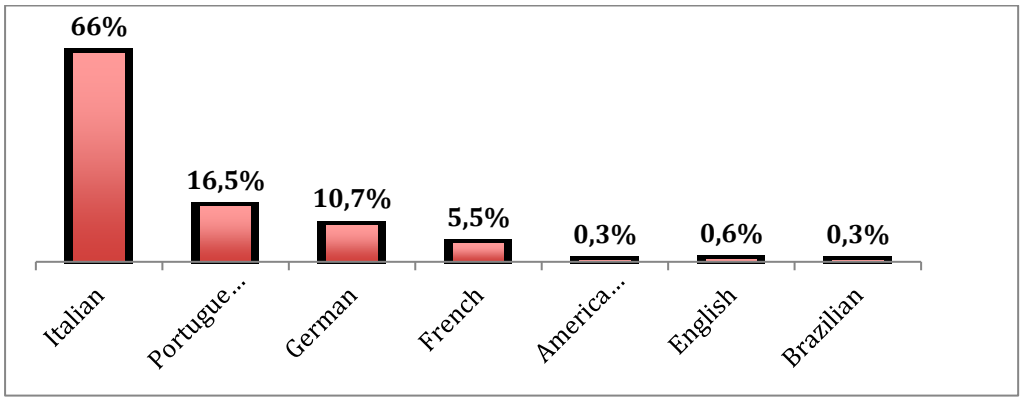

Figure 18: Demographics: Nationality

4.2 QR Code awareness and habits

One of the objectives of the research is to understand the level of awareness of consumers with regards to the QR Code on packaging. In fact, the following represents the second research question of this dissertation:

RQ2: What is the level of awareness of QR Codes on Packaging?

In order to investigate it, the questionnaire included one section in which participants could observe a bottle of water with all the details included in the packaging of this specific type of product (Brand Name, Water Facts, Recyclable Logo, Link to the Facebook Page, Link to the Website Page, Barcode etc..). The packaging also included a QR Code in the label.

The image of the packaging was only showed for few seconds and, once the image disappeared, participants were asked which elements they recalled from the packaging.

Surprisingly a moderately high number of participants detected the QR Code on the packaging. In fact, out of 309 respondents, 189 ticked the "QR Code" box in the questionnaire (***Figure 19)***.

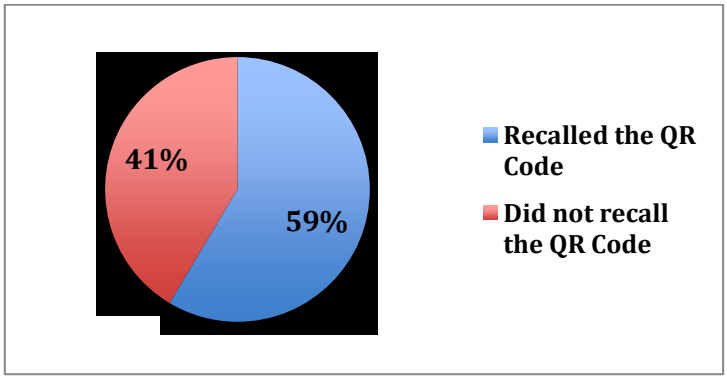

Figure 19 Percentage of people that recalled the QR Code

The last four questions of the survey were built in order to investigate more in depth participants' usage of QR Codes, both in general and specifically applied to packaging.

According to the results, 35% of the sample never scanned a QR Code before the questionnaire. Thus, 108 respondents were excluded from the next questions.
Among those that scanned a QR Code before the questionnaire, the majority either scans a QR Code rarely or very rarely, respectively 20,89% and 41,29%. In fact, only 1,9% of the respondents stated that scans a QR Code "very frequently", and 11,44% of respondents answered "frequently". These are very low percentages if we consider all the QR Code applications available nowadays discussed in Chapter 2, Literature Review. Finally, 24,37% scanned a QR Code on an occasional basis.
When the participants were asked to indicate the frequency with which they scan a QR Code on packaging, percentages are even lower. In fact, nobody scans it "very frequently" and only 3 participants scan a QR Code on packaging on a frequent basis. This indicates that, even though most of the participants recognized the QR Code on the bottled water packaging, there is a very scarce usage of this tool. The number of participants that indicated that they scan a

QR Code on packaging "rarely" and "very rarely", respectively 27,86% and 56,71%, confirms the non-usage of QR Codes applied to packaging.

Finally, one last question aimed at investigating how people usually scan a QR Code. Results show that 79,1% of the participants uses the smartphone camera, whereas 20,9% uses a specific App that allows scanning QR Codes. However, this last percentage is quite high if we consider the low number of participants that scans a QR Code "frequently" or "very frequently". This suggests that is it possible that their smartphones provide them with a default App to scan QR Codes and that they do not use it.

4.3 Reliability of Constructs

Before testing the hypotheses it was appropriate to verify the internal consistency of each construct. This was possible by calculating the Cronbach's Alpha for each of them and thus, by assessing their reliability.

Variable	Cronbach's Alfa	Number of Items
Perceived Usefulness	0,822	5
Perceived Ease of Use	0,847	5
Perceived Enjoyment	0,854	3
Intention to Use	0,835	3

Table 5 Constructs' Cronbach's Alpha

Observing the value of Cronbach's Alpha obtained for each construct, it is possible to state that all of them present internal consistency and that the test was satisfactory. In fact, in order to ensure the reliability of a construct, the Cronbach's Alpha must be greater than 0.7 (Pallant, 2016) and all the constructs presented in ***Table 5*** have a Cronbach's Alpha between 0.822 and 0.854, which translates in a good internal consistency.

Total scales scores were calculated and, in order to check if the values associated to each scale are appropriate, Descriptives were ran.

On average all the variables present high scores with Perceived Ease of Use that has the highest one and Perceived Usefulness that has the lowest one.

	Perceived Usefulness	Intention to Use	Perceived Enjoyment	Perceived Ease of Use
N Valid	309	309	309	309
N Missing	0	0	0	0
Mean	2,36	2,10	2,24	2,00
Std. Deviation	0,79	0,83	0,84	0,59

Table 6 Variables Descriptives

Finally, with the Central Limit Theorem normal distribution of the variables was assumed. In fact, according to the Theorem, as the sample reaches a large size (n>30) the distribution of the sample acquires normality. Given a sample of 309 respondents, normal distribution of the variables was assumed.

4.4 Hypotheses Testing

Different methods have been used in order to explore the relationships between the Independent Variables (Perceived Usefulness, Perceived Ease of Use and Perceived Enjoyment) and the Dependent Variable (Intention To Use).

More specifically Linear Regressions were used in order to see how well one variable is able to predict an outcome; Model 4 in PROCESS macro was instead used in order to verify the mediation effect of Perceived Enjoyment and Perceived Usefulness in the relationship between Perceived Ease of Use and Intention to Use.

When running the Linear Regression the following assumptions were tested in order to ensure valid analysis (Pallant, 2016):

- Normality of Residuals
- Homoscedasticity of Residuals
- Linearity of Residuals
- Independence of Residuals

4.4.1 The effect of Perceived Ease of Use on Intention to Use

In order to explore the effect of Perceived Ease of Use on Intention to Use, a Linear Regression Analysis was conducted. In this analysis Perceived Ease of Use is the predicting variable while Intention to Use is the outcome variable. We refer to this relationship as ***path c***

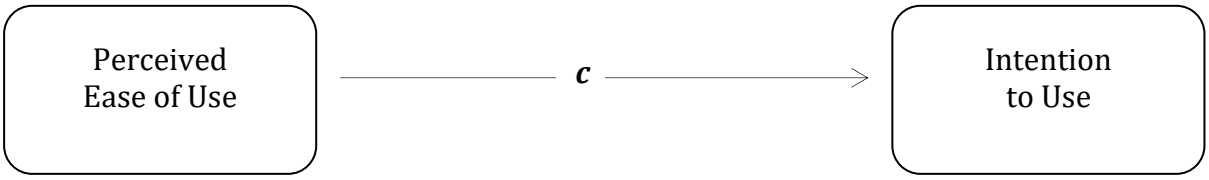

Figure 20 The effect of Perceived Ease of Use on intention to use

Before testing the hypothesis, the four key assumptions of normality, linearity, homoscedasticity and independence of residuals were checked. A non-violation of the normality and linearity assumptions was assessed by looking at the Normal P-P Plot provided by the Linear Regression Analysis at the end of the output page. The plot does not show any major deviation from the diagonal line, and this suggests normality and linearity of error terms (Pallant, 2016). Moreover, normality can also be assessed by looking at the number of cases in the Casewise Diagnostic table. There is only one unusual case that represents less than 1% of the entire sample and according to Pallant (2016) "*in a normally distributed sample we would expect only 1 per cent of cases to fall outside this range*". In order to verify if there is a potential damage caused by this unusual case, Cook's Distance maximum value in the Residual Statistics table was checked: the value is 0.046, which is less than 1 and for this reason does not represent an issue. Homoscedasticity of residuals was assessed with the Scatterplot, which does not present a conical shape, but instead residuals are distributed along the 0 value. The Scatterplot also confirmed the linearity of residuals. Finally, the non-violation of the independence of residuals was assessed through the observation of the Durbin-Watson value in the Model Summary table, which is 1.500 and thus included in the recommended range (between 1.5 and 2.5).

Once the critical assumptions were checked and non-violation ensured, results of the Linear Regression were interpreted. The output (**Appendix 5**) shows that Perceived Ease of Use correlates positively to Intention to Use (Pearson Correlation 0.409 > 0.3). R square is quite low, accounting for 0.167, which means that the model explains 16,7% of the variance in Intention to Use. However, looking at the ANOVA table it is also possible to assess the statistical significance of the results ($p<0.0005$). Going more in depth, the results also showed the contribution of the independent variable in explaining the dependent one. In this case the Unstandardized Beta is 0.577, which means that Perceived Ease of Use contributes well in explaining Intention to Use, and the Standardized Beta is 0,409. This last coefficient tells us that if we increase Perceived Ease of Use by one standard deviation, Intention to Use would increase by 0.409 standard deviation units.
Given the results obtained, **Hypothesis 2a is confirmed:**

- ✓ *Perceived Ease of Use has a positive impact on consumers' Intention to Use QR Codes on packaging*
- ✓

4.4.2 The effect of Perceived Ease of Use on Perceived Usefulness

A Linear Regression Analysis was conducted in order to assess the relationship between Perceived Ease of Use and Perceived Usefulness. Here, Perceived Ease of Use is the predictor (X), while Perceived Usefulness is the outcome variable (Y). We refer to their relationship as **path a_1**

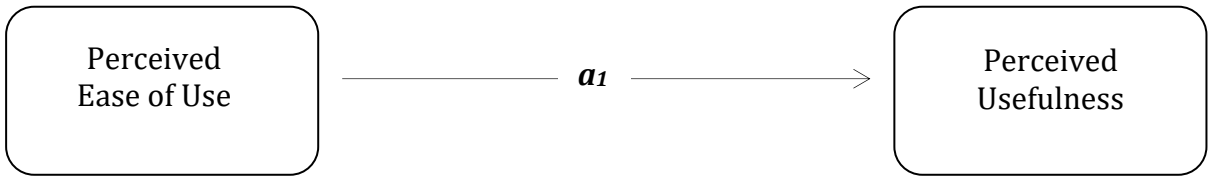

Figure 21 The effect of Perceived Ease of Use on Perceived Usefulness

The interpretation of the results of the linear regression is discussed after the assumptions of the Linear Regression are checked. Normality and linearity of residuals were confirmed by the plots at the end of the output page of the linear regression. In fact, the Normal P-P Plot does not present any deviation from the diagonal line, ensuring normal distribution of residuals. Moreover the Scatterplot does not show a curvilinear shape, suggesting linearity of error terms.

Normality of residuals is also confirmed by the presence of only two (and thus, less than 1% of the entire sample) unusual cases in the Casewise Diagnostic Table. Observing the Cook's Distance value it was possible to state that the unusual cases do not represent a threat to the analysis. In fact, the value is lower than 1 (0,063). The third assumption, homoscedasticity, was tested through the Scatterplot, which showed no sign of heteroscedasticity: errors are equally distributed around 0, without showing any prevailing pattern. Finally, by looking at the Durbin-Watson value provided by the Regression Analysis in the Model Summary table, the non-violation of the independence of residual is confirmed. In fact, the value is comprised between 1.5 and 2.5 (1.589).

According to the results (**Appendix 6**) Perceived Ease of Use positively correlates to Perceived Usefulness (Pearson Correlation 0,430 > 0.3). R square and the statistical significance of the model were also analyzed in order to test this hypothesis.
R square is 0.184, which means that the model explains 18,4% of the variance in Perceived Usefulness, while the model proofed to be statistically significant ($p<0.0005$). Ease of use contributes pretty well in explaining Perceived Usefulness. In fact, Beta Unstandardized is 0.582 whereas the Standardized Beta is 0,430, which means that if we increase Perceived Ease of Use by one standard deviation, Perceived Usefulness would increase by 0.430 standard deviation units.
The above results are enough to state that **Hypothesis 2b is confirmed**:

- ✓ *Perceived Ease of Use has a positive impact on Perceived Usefulness of QR Codes on packaging*

4.4.3 The effect of Perceived Usefulness on Intention to Use

In order to assess whether Perceived Usefulness is positively correlated to Intention to Use QR Codes on packaging a Linear Regression Analysis was conducted. Here, Perceived Usefulness is the predicting variable (X) whereas Intention to Use is the outcome variable (Y). We refer to their relationship as **path b_1**

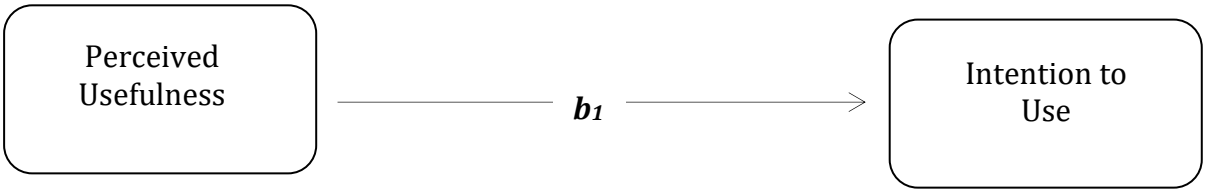

Figure 22 The effect of Perceived Usefulness on Intention to Use

The Normal P-P Plot and the Scatterplot suggest that assumptions of normality and linearity of residuals are not violated. In fact, there is no deviation from the diagonal line in the Normal P-P Plot and the Scatterplot does not show any curvilinear shape. Instead, error terms are distributed in a rectangular shape around zero. This last observation also suggests homoscedasticity of residuals and thus, the third assumption is validated as well. Normality is further confirmed by the presence of only 1 unusual case in the Casewise Diagnostic, representing less than 1% of the sample. Moreover, in order to verify whether the unusual case could be dangerous for the analysis, Cook's Distance value was observed. The values resulted lower than 1 (0,114) and for this reason the case is kept in the dataset. Finally, the Durbin-Watson value resulted 1,888, suggesting a non-violation of the assumption of independence of residuals.

Once the assumptions of the Linear Regression were validated, the results were interpreted in order to verify the presence of a positive influence of Perceived Usefulness on Intention to Use (**Appendix 7**). According to the results Perceived Usefulness positively correlates to Intention to Use (Pearson Correlation 0,434 > 0.3). In the ANOVA table it is possible to see if the results are statistically significant. In this case the model presents statistical significance ($p<0.0005$). Observing the R square in the Coefficients table the model explains 19% of the variance in Intention to Use ($R^2=0.188$).

Moreover, both Unstandardized and Standardized Beta, 0,452 and 0,434 respectively, were taken into consideration in order to establish the contribution of Perceived Usefulness in explaining Intention to Use. The value of the Standardized Beta suggests that that if we increase Perceived Usefulness by one standard deviation, Perceived Usefulness would increase by 0.434 standard deviation units.

The results obtained from the Linear Regression Analysis suggest that **Hypothesis 1a is confirmed:**

- ✓ *Perceived Usefulness has a positive impact on consumers' intention to use QR Codes on Packaging.*

Literature Review revealed that in the study carried out by Davis (1989) Perceived Usefulness mediated the relationship ease-usage. For this reason Model 4 from PROCESS macro was used in order to verify whether a mediation effect was present in this model as well. In the following analysis Perceived Ease of Use is the independent variable X, Perceived Usefulness is the mediator (M) and Intention to Use is the outcome variable (Y) (**Appendix 8**).

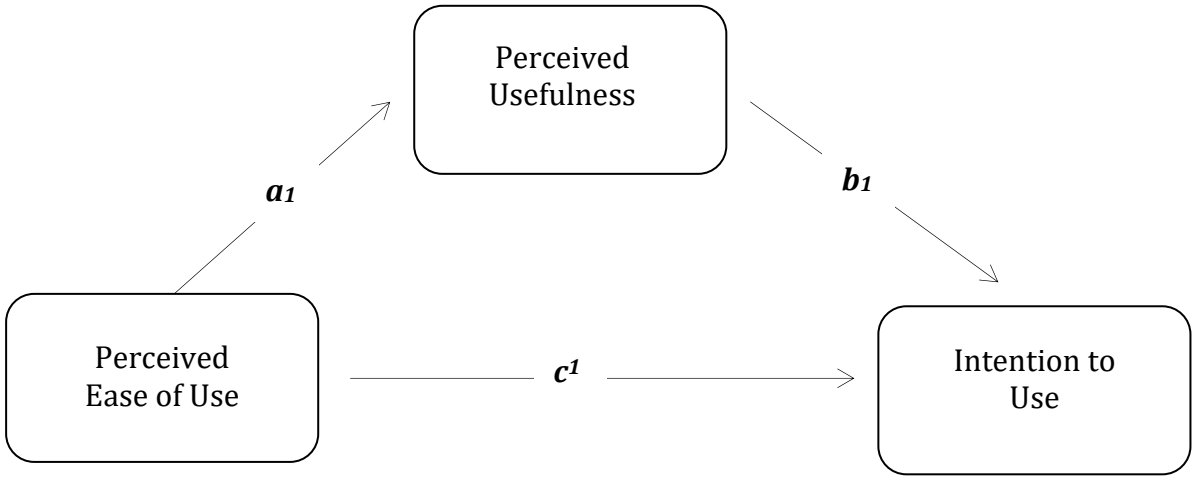

Figure 22 The effect of Perceived Ease of Use on Intention to Use through Perceived Usefulness

C_1, which is the indirect effect of the independent variable (Perceived Ease of Use) on the dependent variable (Intention to Use) after controlling for the mediator (Perceived Usefulness) is 0,3853, which is smaller than **c** = 0,577. This indicates that there is no full mediation because c_1 is different from zero. However, c_1 presents a substantial reduction if compared to ***c*** and it is statistically significant (p<0.0005). These results suggest that **there is a partial mediation**.

The Sobel Test, which aims at testing the statistical significance of a mediation effect, also supports the result. During the Multiple Linear Regression Analysis **a,** s_a, **b and** s_b resulted as:

$a = 0,582$	$b = 0,452$
$s_a = 0,070$	$s_b = 0,054$

With these values it was possible to conduct the Sobel Test and the results supported the existence of a mediation effect. In fact, Z=5.8988 and p<0,001 (Preacher & Leonardelli).

4.4.4 The effect of Perceived Ease of Use on Perceived Enjoyment

A Linear Regression Analysis was conducted in order to assess the relationship between Perceived Ease of Use and Perceived Enjoyment. Here, Perceived Ease of Use is the predictor (X), while Perceived Enjoyment is the outcome variable (Y). We refer to their relationship as **path a_2**

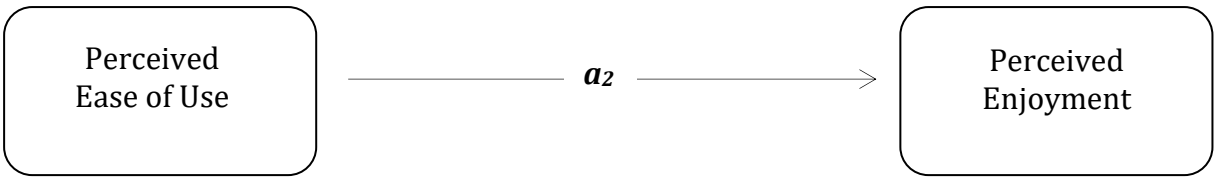

Figure 23 The effect of Perceived Ease of Use on Perceived Enjoyment

The four key assumptions of Linear Regression were checked before the interpretation of the results. Normality and Linearity were confirmed by looking at the Normal P-P Plot and the Scatterplot, which respected the standard suggested in order to run a valid Linear Regression. Normality is also confirmed by the absence of cases in the Casewise Diagnostic table. Moreover, the Scatterplot did not show any sign of heteroscedasticity: the third assumption was validated. Finally, the Durbin-Watson value is 1.919, very close to 2, which assesses the independence of error terms.

According to the results (**Appendix 9**) Perceived Ease of Use presents a small but positive correlation to Perceived Enjoyment (Pearson Correlation 0,314 > 0.3).
Also R square is very small. Accounting for 0,098, meaning that the model explains 10% of the variance in Perceived Enjoyment. If these values are compared with those obtained in the Linear Regression Analysis where Perceived Ease of Use was the predictor variable and Perceived Usefulness was the outcome variable, we can see that here values are quite smaller. However, the model is still statistically significant (p<0.0005).

Finally, Beta Unstandardized is 0.451, which indicates the unique contribution of Perceived Ease of Use in explaining Perceived Enjoyment, whereas the Standardized Beta is 0,314, which means that if we increase Perceived Ease of Use by one standard deviation, Perceived Enjoyment would increase by 0.314 standard deviation units.

Even though the relationship between the two variables is weaker if compared to the other relationships existing in the model, the results obtained suggest that **Hypothesis 2c is confirmed**:

- ✓ *Perceived Ease of Use has a positive impact on Perceived Enjoyment of QR Codes on packaging*

4.4.5 The effect of Perceived Enjoyment on Intention to Use

In order to test the last hypothesis, a Linear Regression Analysis was run to investigate the relationship between Perceived Enjoyment and Intention to Use. More precisely, the aim is to understand whether Perceived Enjoyment positively influences consumers' Intention to Use QR Codes on packaging. In the Linear Regression Analysis, Perceived Enjoyment was the predicting variable (X) whereas Intention to Use was the outcome variable (Y). We refer to their relationship as ***path b_2***

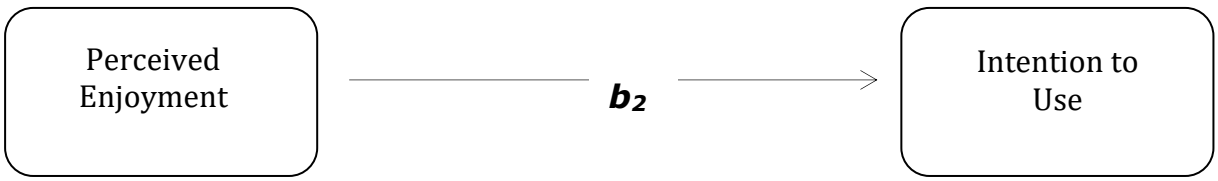

Figure 24 The effect of Perceived Enjoyment on Intention to Use

As for all the other Linear Regression Analysis, also for this one the assumptions were validated. Looking at the Normal P-P Plot and the Scatterplot, normality and linearity can be confirmed given the absence of major deviations from the diagonal line, suggesting normality, and the rectangular shape created by the error terms in the Scatterplot, suggesting linearity. Normality of residuals is also confirmed by the presence of only two unusual cases in the Casewise Diagnostic table accounting for less than 1% of the entire sample. Moreover, Cook's Distance value is 0.172, indicating that these unusual cases do not represent a problem for the

analysis since the value is smaller than 1. However the Scatterplot presented a sign of heteroscedasticity, and for this reason the assumption of homoscedasticity of residuals was slightly violated. Nevertheless, in order to address this problem and to run a valid analysis, a Weighted Least Squares Regression Analysis was ran with the purpose of eliminating the effect of those cases causing the disturbance.

Results obtained from the Weighted Least Squares Regression Analysis (**Appendix 10**) show that there is a strong positive relationship between the two variables, in fact Pearson Correlation= 0,647. Also R square is high (R^2=0,419), which means that the model explains 42% of the variance in Intention to Use. The ANOVA table suggests that the model is statistically significant (p<0.0005). Unstandardized and Standardized Beta values are pretty high as well. In fact Perceived Enjoyment makes a unique contribution in explaining Intention to Use (Unstandardized B= 0,627), and for every increase of one unit of standard deviation in Perceived Enjoyment, Intention to Use would increase by 0,647 standard deviation units (Standardized Beta= 0,647).
In view of the results obtained, ***Hypothesis 3a is confirmed:***

- ✓ *Perceived Enjoyment has a positive impact on consumers' intention to use of QR Codes on Packaging.*

Just as Perceived Usefulness, Perceived Enjoyment mediated the relationship usage-intention in the research carried out by Davis, Bagozzi and Warshaw (1992). Model 4 from PROCESS macro was used in order to verify the existence of a mediation effect. In the following model, Perceived Ease of Use is the independent variable (X), Perceived Enjoyment is the mediator (M) and Intention to Use is the dependent variable (Y) (**Appendix 11**).

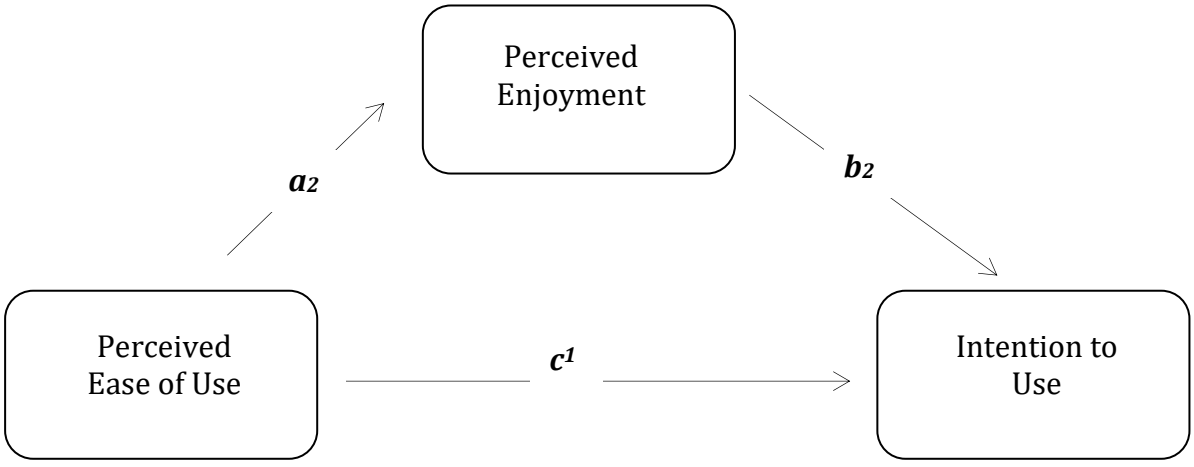

Figure 25 The effect of Perceived Ease of Use on Intention to Use through Perceived Enjoyment

Path $\mathbf{c_1}$ is 0.3330 which is less than **c** = 0,577. This first result indicates that there is no full mediation because c_1 is different from zero. However, $\boldsymbol{c_1}$ presents a substantial reduction if compared to ***c*** and it is statistically significant (p<0.0005). These results suggest that **there is a partial mediation**.

In order to the statistical significance of the mediation effect, the Sobel Test was ran. During the Multiple Linear Regression Analysis **a,** $\mathbf{s_a}$, **b and** $\mathbf{s_b}$ resulted as:

$\boldsymbol{a}$**=** *0.452*	$\boldsymbol{b}$**=**0.627
$\boldsymbol{s_a}$**=** 0.078	$\boldsymbol{s_b}$**=** 0.042

The Sobel Test supports the results obtained through Model 4 on PROCESS, and assessed the statistical significance of the mediation effect. (Z=5.39176 and p<0,001) (Preacher & Leonardelli).

4.5 Difference among groups

The aim of the following analysis is to investigate the existence of a significant difference in people's intention to use a QR Code on packaging depending on the type of QR Code. As discussed in Chapter 2, Literature Review, the study identified two main type of QR Code: Informative and Entertaining. Given this distinction, the following research question was formulated:

RQ4: What type of content are consumers willing to be directed to once scanned the QR Code?

Chapter 3, Methodology, was useful in order to understand the design of the research. In fact, two different QR Codes were created: one informative and one entertaining. One group of respondents (103) only saw the informative QR Code, whereas the other group (103) saw the entertaining QR Code. The last group, composed by 103 responses constituted the control group that will be excluded from this analysis.

In order to understand whether a specific type of QR Code on packaging leads to a higher intention to scan it, a dummy variable was created and a Mann-Whitney U Test conducted. The reason why this kind of test was used is that the population decreased, and now there are 103 observations per group instead of 306 observations as an entire sample. Even though the Central Limit Theorem could be applied to these groups as well (because n>30), the sample approximates normal distribution when it gets larger. Now that the sample size is decreased a Mann-Whitney U Test was adopted. The latter, in fact, is a non-parametric statistic that does not require the normal distribution of the sample.

The Mann-Whitney U Test is the alternative to the t-test for independent samples when the sample is not normally distributed. In fact, it allows comparing two groups (informative/entertaining) on a continuous variable (intention to use).

Before the test was run, the assumptions for non-parametric techniques were validated. Non-parametric tests require the sample to be random and observations to be independent (Pallant, 2016). The sample object of the analysis met both requirements.

When running the Mann-Whitney Test (**Appendix 12**), the very first observations focused on the Ranks table, in order to verify the exactness of the number of participants for each group and to have a first insight on the means.

	TYPE OF QR CODE	N	MEAN RANKS	SUM OF RANKS
INTENTION TO USE	INFORMATIVE	103	112,89	11628,00
	ENTERTAINING	103	94,11	9693,00

Table 7 Mann-Whitney Test

Table 7 shows the right number of observations for the two groups, accounting for 103 for each group, for a total of 206 observations. Looking at the mean ranks it is possible to detect a difference: respondents that saw the entertaining QR Code gave more positive valuations if compared to the informative QR Code. In fact, the mean of the continuous variable Intention to Use for the Entertaining group is 94,11 whereas for the Informative group is 112,89. In this specific case, the entertaining QR Code seems to lead to a higher intention to use. In fact, since in the questionnaire 1=”extremely likely” and 7=”extremely unlikely”, the lowest mean indicates a higher intention to use QR Codes on packaging. These first results suggest that there

is a difference between the two groups. However, before any conclusion was taken, the assumption and the statistical significance of the Mann-Whitney Test. Looking at the Test Statistics table, the test is statistically significant. In fact, p=0.032 which is lower than 0.05. Since the Mann-Whitney U Test compares medians, instead of means as in the t-test, another procedure was run in order to obtain the median scores for each group.

	TYPE OF QR CODE	N	MEDIAN
INTENTION TO USE	INFORMATIVE	103	2,000
	ENTERTAINING	103	1,6667

Table 8 Intention To Use Medians: Informative vs. Entertaining

The Mann-Whitney U Test indicated a significant difference ($p<0.05$) in the intention to use levels depending on whether the respondents scanned an informative QR Code (Median =2,000) or an entertaining QR Code (Median=1,6667).

4.6 Discussion

The first Research Question of this study was:

> **RQ1**: "What is QR Code and what are its applications? What are the opportunities and challenges of QR Code on packaging?"

Chapter 2, Literature Review, provided the reader with all the information necessary in order to answer this first research question. In fact, the chapter deals with its invention and its applications, going more in depth with its applications on products packaging. With regard to this trend, Chapter 2 also provides the reader with real examples of well known brands and identifies two types of QR Codes on packaging: informative and entertaining. Finally, Chapter 2 aimed at discussing the challenges and opportunities of this tool.

The second Research Question was formulated in order to understand whether respondents were aware or not of the existence of QR Codes on packaging. The stated objective was summarized in the following research question:

> **RQ2:** "What is the level of awareness of QR Codes on Packaging?"

In order to understand the level of awareness of QR Codes on packaging three main results are taken into consideration. First of all, respondents saw an image of a bottled water packaging that disappeared after few seconds. Respondents were asked to indicate the elements they remembered being on the packaging. Results show that, even though the majority of the sample recalled the QR Code on the packaging (59%), a significant percentage did not recognize the QR Code (41%). This first result suggests that there is room for improvement in term of raising awareness of QR Codes.

Secondly, in order to understand the level of awareness another important result was taken into consideration: the number of respondents that did not scan the QR Code. As presented in the Analysis section, 89 respondents indicated that they did not scan the QR Code. This is a large number of people if we consider a sample of 404 respondents, knowing that 1/3 of the entire sample represented the control group and thus did not saw the QR Code. Low awareness of QR Codes in general (and not exclusively on packaging) is also indicated by the fact that 43% of the people who did not scan the QR Code did not know how to scan it.

Finally, 35% of the sample never scanned a QR Code before the questionnaire. This is a big number if we consider all the contexts in which we are nudged to scan a QR Code: we find it on billboards, magazines, products' packaging, in restaurants and so on.

These three results indicate that, even though the majority of the sample noticed the QR Code on the bottle packaging, scanned the QR Code on the questionnaire and scanned a QR Code at least once before they answered the questionnaire, there is room for improvement. By increasing QR Code awareness it is possible that its usage increases as well.

The third Research Question was developed in order to understand which factors drive consumers' usage of QR Codes on Packaging:

RQ3: "What are the drivers on a person's likelihood to use QR Codes on packaging?"

Three potential drivers of usage intention were identified through the study of literature: Perceived Usefulness, Perceived Ease of Use and Perceived Enjoyment.
The analysis confirmed all the hypotheses and showed that all of them have a significant and positive impact on the outcome variable (Intention to Use). However the independent variable

with the strongest impact on Intention to Use is Perceived Enjoyment as can be observed in ***Table 9***, which summarizes the results of the hypothesis testing.

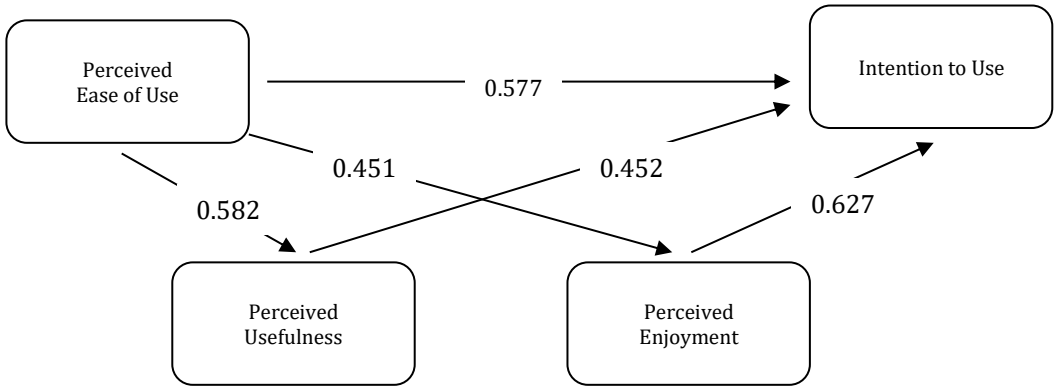

Table 9 Conceptual Framework

Hypothesis	Independent Variable	Dependent Variable	Correlation	R^2	Direction of relationship
H1a	PU	IU	0,452	18,8%	Positive
H2a	PEOU	IU	0,577	16,7%	Positive
H2b	PEOU	PU	0,582	18,4%	Positive
H2c	PEOU	PE	0,451	9,8%	Positive
H3a	PE	IU	**0,627**	**41,9%**	Positive

Table 10: Summary of relationship between the variables

Other than direct effects, also indirect effects were tested. In fact, some studies proofed that the relationship ease-usage might be mediated by one or both the other independent variables: Perceived Usefulness and Perceived Enjoyment. The analysis revealed the existence of a significant mediation in both cases, however none of them was a full mediation. In fact, Perceived Usefulness and Perceived Enjoyment partially mediate the relationship ease-usage.

Finally, the study identified two main types of QR Codes that today are applied to packaging: informative and entertaining. In order to make the analysis more relevant the following research question was formulated:

RQ4: “What types of content are consumers willing to be directed to once scanned the QR Code?”

The results of the non-parametric test showed a statistically significant difference between the two independent groups in their intention to use QR Codes. The study revealed that people that saw the entertaining QR Code are more willing to scan a QR Code on Packaging in the future than the people that saw the informative QR Code.

CHAPTER 5: CONCLUSIONS AND LIMITATIONS

5.1 Conclusions

After all the analyses were run, it is possible to affirm that all the hypotheses were confirmed. In fact, the Linear Regression Analyses and the Weighted Least Squares Regression Analysis confirmed the positive influence of Perceived Ease of Use, Perceived Usefulness and Perceived Enjoyment on Intention to Use. The statistical significance of these analyses suggests the appropriateness of the model in predicting acceptance and usage intention of QR Codes on packaging among Italian students and young workers. Moreover, the model acquires validity after all the construct measurements passed the reliability analysis in which desired Cronbach's Alpha values were obtained and all assumptions for the analyses were tested and validated.
Concerning the awareness of QR Codes on packaging, coherently with literature, the analysis revealed that many people do not know, never noticed or never scanned a QR Code on packaging, and for this reason there surely is room for improvement. Finally, an interesting result emerged when the two groups that saw two different QR Codes were compared in their intention to use it: the entertaining QR Code was more successful and scores for intention to use were higher (closer to 1, where 1= extremely likely).

5.2 Managerial Implications

By testing the effects of Perceived Ease of Use, Perceived Usefulness and Perceived Enjoyment on Intention to Use, this study wanted to understand which characteristics a QR Code applied on a product packaging should have in order to stimulate consumers' usage of this tool. If on one hand it is true that the application of a QR Code on product packaging does not require huge investments by companies, on the contrary is very cheap, on the other hand a wrong usage of this tool can compromise the brand image in consumers' mind. In fact, as presented in the Literature Review section, Chapter 2, QR Code can be seen as an obsolete and useless tool if it is not used in the right way. The results obtained bring insights that become relevant when designing a QR Code for products packaging. While an improvement in the ease of use of QR Codes on packaging does not seem to be necessary because of the high level of respondents' perceived ease of use (the highest score among all the independent variables), an improvement in the usefulness and enjoyment of this tool can be made. Consumers are becoming everyday more aware of environmental issues and they are more demanding when it comes to

information. They want to be informed on where the product comes from, where it was produced, the conditions in which it was produced, if recycled materials were used, if the product is cruelty free and so on. Given this consumers' need, marketers should exploit the QR Code as a mean to share information and to meet consumers' demand and expectations. In fact, the classic product packaging offers limited space for a complete description of the product and does not allow marketers to communicate consumers what they want to know (they can do this through certifications but they can't tell their story, which sometimes makes the difference). Moreover, from the analysis emerged that also perceived enjoyment positively influences the intention to use QR Codes on packaging. Thus, when designing a QR Code for a product packaging, marketers should be aware that the entire process of scanning a QR Code and its usage should be enjoyable for consumers. One real example that should be taken into consideration is the Amazon case. In fact, the company launched the "SmileCodes", which allow consumers to access special offers. The interesting part in this case is that the QR Code presents a smile at its center: this represents a customization of the QR Code which increases brand awareness, and it is only scannable through the Amazon App, which drives consumers to download it and to become clients. Moreover, the QR Codes were printed and randomly distributed around the city: for example it is possible that a consumer passes by an Amazon Locker and finds a SmileCode that allows to open one of the lockers and instantly collect the gift. In this case consumers were not only directed to an entertaining content, such as the promotion, but the entire process of scanning the QR Code was enjoyable for them. Finally, the research revealed that given the two types of QR Codes that were generated, consumers are more willing to use the QR Code when it provides with an entertaining content. This is an important result that might be relevant when designing a QR Code. Being able to interact with consumers is nowadays companies' mission and a cheap marketing tool such as the QR Code could be powerful in connecting companies with consumers. By knowing that an entertaining QR Code leads to an increased level of intention to use it, marketers should design it in this way in order to exploit all its opportunities: product positioning, branding strategy, customer engagement and brand awareness.

5.3 Limitations and Future Research

Even though the model proofed to be accurate in predicting consumers' intention to use QR Codes on packaging, this study presents some limitations as well.

First of all, an experiment would have been the most accurate method to collect data. In fact, the researcher could have better observed respondents' behavior with regards to the QR Code and control whether they effectively scanned it or not. However, time and money constraints didn't make it possible. The sample presents some limitations as well. In fact, the number of respondents could have been higher and evenly distributed among different ages, sex and professions. As the demographic analysis revealed the respondents were mainly women, students or young professionals, aged between 18 and 29 years old. For the above-mentioned reasons, future researchers on this topic should run an experiment and a higher number of respondents is suggested. The research used a bottle of water for this study and thus only one product category. It would be interesting to understand whether these results can be generalized or not by showing the respondents a QR Code applied to the packaging of another product category. Moreover, it would be interesting to investigate whether personal characteristics of respondents influence the level of usage intention and how they determine the preference of one specific QR Code content (informative or entertaining). It would also be interesting to investigate this last preference based on age range, in order to use different QR Codes content to target different kinds of consumers based on the products they purchase. Given the possibility of customization of QR Codes, for example including a brand element in it, future research could explore whether this trend positively influences the usage of QR Code. Finally, a less macro perspective on QR Codes content should be explored. Future researches should consider investigating consumers' usage intention with regards to different types of content considered either informative or entertaining. For example, in the entertaining category it would be interesting to understand if consumers prefer promotions, contests or video. In this way the research would provide with more detailed insights and more specific QR Code contents can be designed according to consumer preferences.

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APPENDICES

Appendix 1: Survey Flow

Start of Block: INTRODUCTION

Q1
Thank you very much for you time.
This questionnaire was built in order to collect data for my thesis, necessary to complete my studies at Bocconi University and Universidade Catolica Portuguesa.

Note that, in order to deliver valuable answers **you should open this questionnaire from your laptop and have your mobile phone with you.**

There are no right or wrong answers, but it is very important that you answer all the questions.

THANK YOU

End of Block: INTRODUCTION

Start of Block: DEMOGRAPHICS

Q2 What is your gender?

- ○ Male (1)
- ○ Female (2)

Q3 What is your age?

- ○ Under 18 years old (1)
- ○ 18-29 years old (2)
- ○ 30-39 years old (3)
- ○ 40-49 years old (6)
- ○ 50-59 years old (4)
- ○ 60 years and over (7)

Q4 What is the highest level of education you have completed?

- ○ Less than high school diploma (1)
- ○ Highschool degree (2)
- ○ Undergraduate degree (Bachelor or equivalent) (3)
- ○ Postgraduate degree (Master or equivalent) (4)
- ○ Professional degree (PhD or equivalent) (5)
- ○ Other (6)

Q5 What is your current employment status?

- ○ Employed full time (1)
- ○ Employed part time (2)
- ○ Student (3)
- ○ Self-employed (4)
- ○ Unemployed and currently looking for work (5)
- ○ Retired (6)
- ○ Unable to work (7)

Q6 What is your nationality?

- ○ Italian (1)
- ○ Portuguese (2)
- ○ German (3)
- ○ French (4)
- ○ Other, please indicate: (5) _____

Q7 What is approximately your yearly gross income?

- Less than €10,000 (1)
- €10,000 - €19,999 (2)
- €20,000 - €29,999 (3)
- €30,000 - €39,999 (4)
- €40,000 - €49,999 (5)
- €50,000 - €59,999 (6)
- €60,000 - €69,999 (7)
- €70,000 - €79,999 (8)
- €80,000 - €89,999 (9)
- €90,000 - €99,999 (10)
- €100,000 - €149,999 (11)
- More than €150,000 (12)
- I prefer not to answer (13)

End of Block: DEMOGRAPHICS

Start of Block: STIMULI

Q8 Do you drink bottled water?

- Yes (1)
- No (2)

Skip To: End of Survey If Q8 = No

Page Break

Q9
In the next page an image will appear for 15 seconds.
Please, observe it.


natural mineral water
Santa Domitilla
Since 1948
50ml
still water
natural mineral water
scan me
50ml
still water

Page Break

Q12 What did you notice on the packaging?
(Check all that apply)

- ☐ Material of Packaging (1)
- ☐ Color of Packaging (2)
- ☐ Name of the water brand (3)
- ☐ Image of a mountain (4)
- ☐ Facebook Account (5)
- ☐ Website (6)
- ☐ Qr Code (7)
- ☐ Barcode (8)
- ☐ Recyclable Logo (9)
- ☐ Bottle size (10)
- ☐ Type of water (11)
- ☐ Water facts (12)

Page Break

Q13 Do you own a smartphone?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If Q13 = No

Q14 What brand is your smartphone from?

- ○ Iphone (1)
- ○ Samsung (2)
- ○ Huawei (3)
- ○ LG (4)
- ○ Nokia (5)
- ○ Lenovo (6)
- ○ Other (7)

Page Break

Q15 Do you have an App to scan QR Codes?

- ○ Yes (1)
- ○ No (2)

Page Break

End of Block: STIMULI

Start of Block: DIRECTLY TO QUESTIONNAIRE

Q16 You will soon be re-directed to a questionnaire.

End of Block: DIRECTLY TO QUESTIONNAIRE

Start of Block: INFORMATIVE WITH SCAN

Q18 Please, now scan the QR Code with your smartphone and visit the website.
After that you will be able to move on with the questionnaire.

Q19

Page Break

Q21 Did you scan the QR Code?

- Yes (1)
- No (2)

Skip To: End of Block If Q21 = Yes

Q22 Why didn't you scan the QR Code?

- I don't know how to scan (1)
- The QR Code wasn't working (2)
- I don't have an App to scan the QR Code (4)
- Other (6) _____

Skip To: End of Survey If Q22 = I don't know how to scan
Skip To: End of Survey If Q22 = The QR Code wasn't working
Skip To: End of Survey If Q22 = I don't have an App to scan the QR Code
Skip To: End of Survey If Q22 = Other

End of Block: INFORMATIVE WITH SCAN

Start of Block: ENTERTAINING WITH SCAN

Q23 Please, now scan the QR Code with your smartphone and visit the website within the next minutes.
After that you will be able to move on with the questionnaire.

Q24

Page Break

Q26 Did you scan the QR Code?

- Yes (1)
- No (2)

Skip To: End of Block If Q26 = Yes

Q27 Why didn't you scan the QR Code?

- I don't know how to scan a QR Code (1)
- The QR Code wasn't working (2)
- I don't have an App to scan the QR Code (4)
- Other, please indicate (3) _____

Skip To: End of Survey If Q27 = I don't know how to scan a QR Code
Skip To: End of Survey If Q27 = The QR Code wasn't working
Skip To: End of Survey If Q27 = Other, please indicate
Skip To: End of Survey If Q27 = I don't have an App to scan the QR Code

End of Block: ENTERTAINING WITH SCAN

Start of Block: QUESTIONNAIRE

Q28 Please, let me know what you think

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
Using QR Code on packaging would make me a smarter consumer (1)	○	○	○	○	○	○	○
Using QR Code on packaging would make my shopping easier (2)	○	○	○	○	○	○	○
Using QR Code on packaging would save money (3)	○	○	○	○	○	○	○
Using QR Code on packaging make shopping more enjoyable (4)	○	○	○	○	○	○	○
Overall QR Code on packaging is very useful (5)	○	○	○	○	○	○	○

Page Break

Q29 Please, let me know what you think

	Extremely likely (1)	Likely (2)	Slightly likely (3)	Neither likely nor unlikely (4)	Slightly unlikely (5)	Unlikely (6)	Extremely unlikely (7)
Learning to operate QR Code on packaging would be easy for me (1)	○	○	○	○	○	○	○
I would find it easy to get QR Code on packaging to do what I want to do (2)	○	○	○	○	○	○	○
My interaction with QR Code on packaging would be clear and understandable (3)	○	○	○	○	○	○	○
I would find QR Code on packaging to be flexible to interact with (4)	○	○	○	○	○	○	○
It would be easy for me to become skillful at using QR Code on packaging (5)	○	○	○	○	○	○	○

Page Break

Q30 Please, let me know what you think

	Extremely likely (1)	Likely (2)	Slightly likely (3)	Neither likely nor unlikely (4)	Slightly unlikely (5)	Unlikely (6)	Extremely unlikely (7)
I find using QR Code on packaging to be enjoyable (1)	○	○	○	○	○	○	○

Q31 Please, let me know what you think

	Extremely pleasant (1)	Pleasant (2)	Slightly pleasant (3)	Neither pleasant nor unpleasant (4)	Slightly unpleasant (5)	Unpleasant (6)	Extremely unpleasant (7)
Using QR Code on packaging would be (1)	○	○	○	○	○	○	○

Q32 Please, let me know what you think

	Extremely likely (1)	Likely (2)	Slightly likely (3)	Neither likely nor unlikely (4)	Slightly unlikely (5)	Unlikely (6)	Extremely unlikely (7)
I would have fun using QR Code on packaging (1)	○	○	○	○	○	○	○

Page Break

Q33 Please, let me know what you think

	Extremely likely (1)	Likely (2)	Slightly likely (3)	Neither likely nor unlikely (4)	Slightly unlikely (5)	Unlikely (6)	Extremely unlikely (7)
I intend to increase my use of QR code on packaging (1)	○	○	○	○	○	○	○
I intend to invest my time and effort on QR code on packaging (2)	○	○	○	○	○	○	○
I intend to use QR codes on packaging in the future (3)	○	○	○	○	○	○	○

End of Block: QUESTIONNAIRE

Start of Block: QR CODE HABITS

Q34 Have you ever scanned a QR Code before?

○ Yes (1)

○ No (2)

Skip To: End of Survey If Q34 = No

Q35 How often did it happen to you to scan a QR Code?

○ Very frequently (1)

○ Frequently (2)

○ Occasionally (3)

○ Rarely (4)

○ Very rarely (5)

Q36 How often did it happen to you to scan a QR Code on packaging?

- ○ Very frequently (1)
- ○ Frequently (2)
- ○ Occasionally (3)
- ○ Rarely (4)
- ○ Very rarely (5)

Q37 What did you use to scan the QR Code?

- ○ Smartphone camera (1)
- ○ App to scan QR Code (2)
- ○ Other, please indicate (3) _____

End of Block: QR CODE HABITS

Appendix 2: SPSS Output – Demographics Statistics

What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	126	40,8	40,8	40,8
	Female	183	59,2	59,2	100,0
	Total	309	100,0	100,0	

What is your age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 18 years old	14	4,5	4,5	4,5
	18-29 years old	255	82,5	82,5	87,1
	30-39 years old	23	7,4	7,4	94,5
	40-49 years old	11	3,6	3,6	98,1
	50-59 years old	2	,6	,6	98,7
	60 years and over	4	1,3	1,3	100,0
	Total	309	100,0	100,0	

What is the highest level of education you have completed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than high school diploma	9	2,9	2,9	2,9
	Highschool degree	12	3,9	3,9	6,8
	Undergraduate degree (Bachelor or equivalent)	95	30,7	30,7	37,5
	Postgraduate degree (Master or equivalent)	190	61,5	61,5	99,0
	Professional degree (PhD or equivalent)	3	1,0	1,0	100,0
	Total	309	100,0	100,0	

What is your current employment status?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employed full time	124	40,1	40,1	40,1
	Employed part time	27	8,7	8,7	48,9
	Student	140	45,3	45,3	94,2
	Self-employed	9	2,9	2,9	97,1
	Unemployed and currently looking for work	8	2,6	2,6	99,7
	Retired	1	,3	,3	100,0
	Total	309	100,0	100,0	

What is your nationality? - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Italian	204	66,0	66,0	66,0
	Portuguese	51	16,5	16,5	82,5
	German	33	10,7	10,7	93,2
	French	17	5,5	5,5	98,7
	American (USA)	1	,3	,3	99,0
	English	2	,6	,6	99,7
	Brazilian	1	,3	,3	100,0
	Total	309	100,0	100,0	

What is approximately your yearly gross income?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than €10,000	153	49,5	49,5	49,5
	€10,000 - €19,999	23	7,4	7,4	57,0
	€20,000 - €29,999	38	12,3	12,3	69,3
	€30,000 - €39,999	34	11,0	11,0	80,3
	€40,000 - €49,999	15	4,9	4,9	85,1
	€50,000 - €59,999	7	2,3	2,3	87,4
	€60,000 - €69,999	4	1,3	1,3	88,7
	€70,000 - €79,999	1	,3	,3	89,0
	€80,000 - €89,999	1	,3	,3	89,3
	€100,000 - €149,999	1	,3	,3	89,6
	More than €150,000	2	,6	,6	90,3
	I prefer not to answer	30	9,7	9,7	100,0
	Total	309	100,0	100,0	

Appendix 3: SPSS Output – QR Code Awareness and QR Code Habits

Statistics

What did you notice on the packaging?(Check all that apply) Qr Code

N	Valid	309
	Missing	0

What did you notice on the packaging?(Check all that apply) Qr Code

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-99	128	41,4	41,4	41,4
	Qr Code	181	58,6	58,6	100,0
	Total	309	100,0	100,0	

Statistics

		Have you ever scanned a QR Code before?	How often did it happen to you to scan a QR Code?	How often did it happen to you to scan a QR Code on packaging?	What did you use to scan the QR Code? - Selected Choice
N	Valid	309	201	201	201
	Missing	0	108	108	108

Have you ever scanned a QR Code before?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	201	65,0	65,0	65,0
	No	108	35,0	35,0	100,0
	Total	309	100,0	100,0	

How often did it happen to you to scan a QR Code?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very frequently	4	1,3	2,0	2,0
	Frequently	23	7,4	11,4	13,4
	Occasionally	49	15,9	24,4	37,8
	Rarely	42	13,6	20,9	58,7
	Very rarely	83	26,9	41,3	100,0
	Total	201	65,0	100,0	
Missing	System	108	35,0		
Total		309	100,0		

How often did it happen to you to scan a QR Code on packaging?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently	3	1,0	1,5	1,5
	Occasionally	28	9,1	13,9	15,4
	Rarely	56	18,1	27,9	43,3
	Very rarely	114	36,9	56,7	100,0
	Total	201	65,0	100,0	
Missing	System	108	35,0		
Total		309	100,0		

What did you use to scan the QR Code? - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Smartphone camera	159	51,5	79,1	79,1
	App to scan QR Code	42	13,6	20,9	100,0
	Total	201	65,0	100,0	
Missing	System	108	35,0		
Total		309	100,0		

Appendix 4: SPSS Output – Reliability Analysis

Perceived Ease of Use

Case Processing Summary

		N	%
Cases	Valid	309	100,0
	Excluded[a]	0	,0
	Total	309	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,847	,856	5

Perceived Usefulness

Case Processing Summary

		N	%
Cases	Valid	309	100,0
	Excluded[a]	0	,0
	Total	309	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,822	,832	5

Perceived Enjoyment

Case Processing Summary

		N	%
Cases	Valid	309	100,0
	Excluded[a]	0	,0
	Total	309	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,854	,861	3

Intention to Use

Case Processing Summary

		N	%
Cases	Valid	309	100,0
	Excluded[a]	0	,0
	Total	309	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,835	,838	3

Appendix 5: SPSS Output – Effect of Perceived Ease of Use on Intention to Use

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ease of use[b]	.	Enter

a. Dependent Variable: intention to use

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,409[a]	,167	,165	,75533	1,500

a. Predictors: (Constant), ease of use

b. Dependent Variable: intention to use

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35,181	1	35,181	61,664	,000[b]
	Residual	175,153	307	,571		
	Total	210,334	308			

a. Dependent Variable: intention to use

b. Predictors: (Constant), ease of use

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,943	,153		6,146	,000
	ease of use	,577	,073	,409	7,853	,000

Appendix 6: SPSS Output – Effect of Perceived Ease of Use on Perceived Usefulness

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ease of use[b]	.	Enter

a. Dependent Variable: total perceived usefulness

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,430[a]	,184	,182	,71786	1,589

a. Predictors: (Constant), ease of use

b. Dependent Variable: total perceived usefulness

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35,790	1	35,790	69,452	,000[b]
	Residual	158,204	307	,515		
	Total	193,994	308			

a. Dependent Variable: total perceived usefulness

b. Predictors: (Constant), ease of use

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,197	,146		8,205	,000
	ease of use	,582	,070	,430	8,334	,000

Appendix 7: SPSS Output – Effect of Perceived Usefulness on Intention to Use

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	total perceived usefulness[b]	.	Enter

a. Dependent Variable: intention to use

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,434[a]	,188	,185	,74586	1,888

a. Predictors: (Constant), total perceived usefulness

b. Dependent Variable: intention to use

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39,548	1	39,548	71,090	,000[b]
	Residual	170,787	307	,556		
	Total	210,334	308			

a. Dependent Variable: intention to use

b. Predictors: (Constant), total perceived usefulness

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	t
1	(Constant)	1,033	,134		7,738
	total perceived usefulness	,452	,054	,434	8,431

Appendix 8: SPSS Output – Effect of Perceived Ease of Use on intention to Use through Perceived Usefulness

```
Model  : 4
    Y  : T_Intent
    X  : T_Easeof
    M  : T_Percei

Sample
Size:  309

**************************************************************************
OUTCOME VARIABLE:
 T_Percei

Model Summary
          R       R-sq        MSE          F        df1        df2
 p
      ,4295      ,1845      ,5153    69,4519     1,0000   307,0000      ,00
00

Model
             coeff         se          t          p       LLCI       ULCI
constant     1,1968      ,1459     8,2051      ,0000      ,9098     1,4838
T_Easeof      ,5820      ,0698     8,3338      ,0000      ,4446      ,7194

Standardized coefficients
             coeff
T_Easeof      ,4295

**************************************************************************
OUTCOME VARIABLE:
 T_Intent

Model Summary
          R       R-sq        MSE          F        df1        df2
 p
      ,4989      ,2489      ,5163    50,6893     2,0000   306,0000      ,00
00

Model
             coeff         se          t          p       LLCI       ULCI
constant      ,5492      ,1612     3,4063      ,0007      ,2319      ,8664

T_Easeof      ,3853      ,0774     4,9781      ,0000      ,2330      ,5376
T_Percei      ,3294      ,0571     5,7653      ,0000      ,2169      ,4418

Standardized coefficients
             coeff
T_Easeof      ,2731
T_Percei      ,3163

************************** TOTAL EFFECT MODEL ****************************
OUTCOME VARIABLE:
 T_Intent

Model Summary
          R       R-sq        MSE          F        df1        df2
 p
      ,4090      ,1673      ,5705    61,6644     1,0000   307,0000      ,00
00

Model
             coeff         se          t          p       LLCI       ULCI
constant      ,9433      ,1535     6,1465      ,0000      ,6413     1,2453
T_Easeof      ,5770      ,0735     7,8527      ,0000      ,4324      ,7216

Standardized coefficients
             coeff
T_Easeof      ,4090
```

Appendix 9: SPSS Output – Effect of Perceived Ease of Use on Perceived Enjoyment

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ease of use[b]	.	Enter

a. Dependent Variable: enjoyment

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,314[a]	,098	,096	,80093	1,919

a. Predictors: (Constant), ease of use

b. Dependent Variable: enjoyment

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21,515	1	21,515	33,540	,000[b]
	Residual	196,936	307	,641		
	Total	218,452	308			

a. Dependent Variable: enjoyment

b. Predictors: (Constant), ease of use

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1,336	,163		8,208	,000
	ease of use	,451	,078	,314	5,791	,000

Appendix 10: SPSS Output – Effect of Perceived Enjoyment on Intention to Use

Variables Entered/Removed[a,b]

Model	Variables Entered	Variables Removed	Method
1	enjoyment[c]	.	Enter

a. Dependent Variable: intention to use

b. Weighted Least Squares Regression - Weighted by weights

c. All requested variables entered.

Model Summary[b,c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,647[a]	,419	,417	1,26650	1,767

a. Predictors: (Constant), enjoyment

b. Dependent Variable: intention to use

c. Weighted Least Squares Regression - Weighted by weights

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	354,872	1	354,872	221,238	,000[c]
	Residual	492,436	307	1,604		
	Total	847,308	308			

a. Dependent Variable: intention to use

b. Weighted Least Squares Regression - Weighted by weights

c. Predictors: (Constant), enjoyment

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	,697	,081		8,577	,000
	enjoyment	,627	,042	,647	14,874	,000

Appendix 11: SPSS Output – Effect of Perceived Ease of Use on intention to Use through Perceived Enjoyment

```
Model  : 4
    Y  : T_Intent
    X  : T_Easeof
    M  : T_Enjoym

Sample
Size:  309

************************************************************************
OUTCOME VARIABLE:
 T_Enjoym

Model Summary
          R       R-sq        MSE          F        df1        df2
 p
      ,3138      ,0985      ,6415    33,5396     1,0000   307,0000      ,00
00

Model
              coeff         se          t          p       LLCI       ULCI
constant     1,3358      ,1627     8,2080      ,0000     1,0155     1,6560
T_Easeof      ,4512      ,0779     5,7913      ,0000      ,2979      ,6045

Standardized coefficients
              coeff
T_Easeof      ,3138

************************************************************************
OUTCOME VARIABLE:
 T_Intent

Model Summary
          R       R-sq        MSE          F        df1        df2
 p
      ,6640      ,4410      ,3843   120,6796     2,0000   306,0000      ,00
00

Model
              coeff         se          t          p       LLCI       ULCI
constant      ,2211      ,1391     1,5899      ,1129     -,0526      ,4948
T_Easeof      ,3330      ,0635     5,2438      ,0000      ,2081      ,4580
T_Enjoym      ,5407      ,0442    12,2395      ,0000      ,4537      ,6276

Standardized coefficients
              coeff
T_Easeof      ,2361
T_Enjoym      ,5510

************************** TOTAL EFFECT MODEL ****************************
OUTCOME VARIABLE:
 T_Intent

Model Summary
          R       R-sq        MSE          F        df1        df2
 p
      ,4090      ,1673      ,5705    61,6644     1,0000   307,0000      ,00
00

Model
              coeff         se          t          p       LLCI       ULCI
constant      ,9433      ,1535     6,1465      ,0000      ,6413     1,2453
T_Easeof      ,5770      ,0735     7,8527      ,0000      ,4324      ,7216

Standardized coefficients
              coeff
T_Easeof      ,4090
```

Appendix 12: SPSS Output – Difference between Informative and Entertaining QR Code

Mann-Whitney Test

Ranks

	TYPE_QR	N	Mean Rank	Sum of Ranks
intention to use	INFORMATIVE	103	112,89	11628,00
	ENTERTAINING	103	94,11	9693,00
	Total	206		

Test Statistics[a]

	intention to use
Mann-Whitney U	4337,000
Wilcoxon W	9693,000
Z	-2,309
Asymp. Sig. (2-tailed)	,021

a. Grouping Variable: TYPE_QR